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ON TRUTH

ON TRUTH

A SYSTEMATIC INQUIRY

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PH.D., M.D., F.R.S.

LONDON

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1889

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TO HIS GRACE

THE DUKE OF NORTHUMBERLAND, K.G.,

PRESIDENT OF THE ROYAL INSTITUTION.

My dear Lord Duke,

In dedicating, by kind permission, this work to your Grace, I desire to give expression to feelings of both esteem and gratitude.

I desire to express my esteem for one whose beneficent career has long practically exemplified the precepts of sound philosophy, and my gratitude for that kindness which has enabled me to enjoy the charm of a retreat so considerately selected in harmony with my tastes and wishes.

With much respect, I am,

My dear Lord Duke,

Yours most sincerely,

ST. GEORGE MIVART.

Hurstcote, Chilworth,

Whitsunday, May 20, 1888.

PREFACE.

IN the following pages the author has sought to place at the disposal of his readers as brief and plain an account as he could render of the results at which he has arrived in a life's pursuit of truth. He has purposely avoided controversy as much as possible; not even having referred to world-renowned philosophers, whose systems have, nevertheless, much occupied his thoughts, and even for a time gained his assent. He has acted thus partly because controversies which relate to the most important questions treated of here have been dealt with by him in other works, but mainly because he is convinced that it is not by negative criticism, but by synthetic construction alone, that the most useful scientific work can now be done. The author presents this volume to the public partly in the hope that his effort may make some slight contribution towards such building up of a solid temple of truth, but with a much stronger wish that it may impel other men, better gifted or more advantageously circumstanced, to further develop and more effectively express the truths herein presented.

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SECTION I.

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ON TRUTH.

CHAPTER I.

EVIDENCE AND CERTAINTY.

Certainty exists, and universal doubt is unreasonable. There must be ultimate truths which do not need proof. The ground on which we believe them is their self-evidence, and no better criterion is possible.

The pursuit of truth and of truths—Need of certainty—Two mental associations—Certainty exists—Unhealthy and irrational scepticism—Reflex mental acts—Some views as to what truths are most indisputable—This inquiry refers to the grounds and criterion of beliefs, not to their origins—Ultimate truths cannot be proved—Self-evidence is the criterion of truth—General, or abstract, necessary truths—Three orders of fundamental certainty—Is a better criterion than evidence possible?—The task of the inquirer after truth.

MOST of us are eager for truth. The popularity of science and the spread of criticism show it. The spirit of inquiry was possibly as keen three hundred years ago, though, perhaps, mainly prompted by ideas of advantage in this world or the next. Now, there are multitudes who seek truth* for its own sake, apart from any advantage it may bring with it. A passionate devotion to truth is the well-founded boast of our scientific worthies, who are above all things anxious not "to believe a lie."

* A special inquiry as to our perception of truth, will be made in our seventeenth chapter.

Yet this popular pursuit of truth is mainly an indirect pursuit of it. It is not, after all, so much a pursuit of "truth" as a pursuit of "truths." It is not the endeavour to discover what is most certain and fundamental in all knowledge, but an endeavour to become acquainted with facts and laws of different branches of knowledge.

The pursuit of truth and of truths.

There is one very important difference between these two quests: a student of any branch of science must, if he would succeed, follow the footsteps of its masters and, at least provisionally, abide by their dicta. It is true that no bonds are imposed except such as originate from, and are justifiable by, observation and deduction. It is true that a questioning attitude is emphatically the scientific attitude, and that in the bracing air of free inquiry physical science has thriven wonderfully, and history has become a pursuit very much more attractive and fruitful of results than ever before. Nevertheless it is impossible for the student of science to dispense with the observations and reasonings of his contemporaries and predecessors, and he will risk failure if he rashly refuses to allow them their proper weight, or to accept some of them, at first, simply upon authority. In the pursuit of truth itself, it is otherwise. The inquirer, in this case, can only appeal to, and must abide by the declarations of, his own reason. He must clearly see the truth attending every step he takes, from the very first. Such direct inquiry concerning truth, though it is not and is not likely to become a popular pursuit, yet counts many more followers amongst us to-day than it did half a century ago. One cause of this increase, is the advance of physical science with its eager spirit of inquiry. Questions more and more fundamental concerning each branch of physical science naturally lead to questions which underlie all physical science. This impulse has been keenly felt by many of our own scientific leaders, who have largely promoted inquiry of this fundamental kind. Now, modesty, no less than caution, is a characteristic of the true man of science. Naturally, then, our scientific leaders have sought, and sought with success, to impress upon their followers a modest estimate of their power of knowing, and the fact that it has very definite limits.

But every one is aware how apt men are, in trying to avoid one extreme, to fall into an opposite one. Doubt and scepticism, which are not only legitimate but necessary in science, are indeed doubly so in the inquiry concerning truth itself. Therein we should assent to nothing which is not clearly and evidently true to our minds. Nevertheless there may be exaggeration in this as in other things. It is possible to be so strongly impressed by the existence and legitimacy of doubt, as to forget the existence and legitimacy of certainty. Yet it is manifest that life could not be carried on as it is, if we had not practical certainty as to its ordinary concerns. We may say more than this; for with regard to many matters which are not of ordinary concern, we have now greater certainty than our forefathers had. Side by side with an increasing scepticism, there has run along an increasing certainty. Thus with respect to the world we live in, most educated men are now certain as to its daily and annual revolutions, as also that its crust is largely composed of sedimentary rocks, containing remains of animals and plants more or less different from those which now live. No one, indeed, can deny that we may rely with absolute confidence and entire certainty upon a variety of such assertions. Science constantly advances, but its advance would be impossible if we could not, by observations and inferences, become so certain of facts previously doubtful, as to be able to make them starting-points for fresh observations and inferences. Nevertheless the certainty which most men feel about such matters cannot, from the nature of the case, be due to their own observations, but must depend upon their confidence in the generally received opinions of experts. The degree of their confidence also, will vary according to circumstances, as is the case with respect to their trust in human testimony generally. A reasonable man who has never been to Berlin and who never saw Napoleon III., will yet be absolutely certain as to the present existence of that city and the past existence of that man. He may feel very differently, however, with respect to some remote antarctic land or ancient Egyptian king. In spite, then, of increased and increasing

Need of certainty.

certainty as to matters scientifically established, it is none the less true that, as a general rule, things which are very distant, or which happened a long time ago, are known to us only in round-about ways, and we feel more or less uncertainty about them. On the other hand, our convictions concerning the things about us at any given moment can be tested by our senses, and we are practically certain regarding them. Now, if we have had several times two feelings or ideas in close conjunction, thenceforth when one of these comes to be freshly experienced, the other tends to arise spontaneously in the mind, which is said to have "associated" the two together. Thus it comes about that we associate a feeling of "uncertainty" with statements about what is remote, and a feeling of "certainty" with what concerns the present. The value of this mental association we will consider later on. A second mental association which men commonly form is that between "what is especially true" and what is "demonstrable by reasoning." This association is due to the fact that most of our knowledge is gained indirectly and by inference. No truths are brought more strikingly home to our minds than those mathematical ones demonstrated by Euclid. We commonly ask for the "proof" of any proposition we are called on to believe, and we feel a special certainty about statements which we know we can prove by unanswerable reasoning. Thus it is many men have, rightly or wrongly, a feeling that "to believe anything which cannot be proved," is "to believe blindly."

Two mental associations.

It is very important to note these two facts of association with respect to our feelings of certainty. As to matters of everyday life, as distinguished from scientific truths, though we therein generally act on reasonable probabilities, yet certainty meets us at every turn. Thus we are absolutely certain that a door must be either shut or open; that if having been open it is now shut, some person or thing must have shut it; that we cannot both spend our money and keep it; that we feel warm or sad if we have either of those feelings; that we are the same individuals in the afternoon as we were in the morning; that if every man of a company has a red coat, then each

Certainty exists.

man must have one; that half a loaf is better than no bread; that England is an island; and that if we throw down a quantity of printer's type it will not so fall as to form a set of verses. Some readers may be impatient at meeting with assertions seemingly as trivial as obviously true. But it is needful to recall to mind the fact that absolute and complete certainty does really exist with respect to such obvious truths, however little we may be given to advert to the fact. It is now especially needful to make these simple truths clear, on account of the before-mentioned present danger of an exaggerated scepticism. Blind disbelief is as fatal to science as blind belief, and it is possible for men to get themselves into a diseased condition of general distrust and uncertainty. Experience proves that they may bring themselves to doubt or deny the plainest truths, the evidence of their senses, the reality of truth or virtue, or even their own existence. It is well, then, distinctly to recognize that universal doubt is scepticism run mad, as the following observations may serve to show. If a man doubts whether there is such a thing as rational speech, or whether words can be used twice over by any two people in the same sense, then plainly we cannot profitably argue with him. But if, on account of his very absurdity, we cannot refute him, it is no less plain that he cannot defend his scepticism. Were he to attempt to do so, then he would show, by that very attempt, that he really had confidence in reason and in language, however he might verbally deny it. Universal scepticism is foolish, because it refutes itself. If a sceptic says, "Nothing is certain," he thereby asserts the certainty of uncertainty. He makes an affirmation which, if true, absolutely contradicts both him and his system. But a man who affirms what the system he professes to adopt forbids him to affirm, and who declares that he believes what he also declares to be unbelievable, can hardly complain if he is called foolish. No system can be true, and no reasoning can be valid, which inevitably ends in absurdity. Such scepticism, then, cannot be the mark of an exceptionally intellectual mind, but of an exceptionally foolish one. It also follows that every position which necessarily leads to such scepticism must itself be essentially unreasonable.

Unhealthy and irrational scepticism.

Reflex mental acts.

Having, then, recognized the existence of certainty and the fact that some things are certain, the next step in the pursuit of truth would seem to be an endeavour to discover "what things are especially true," or "what are those propositions the certainty of which is most indisputable, and which are evidently and supremely true?" In an inquiry concerning what our mind tells us about its own judgments, there is a special difficulty, arising from our organization. For the mind applies itself easily enough to external objects, but has much greater difficulty in directing its gaze in upon itself. We are spontaneously impelled to form judgments about external things, or "direct judgments," but we are not so impelled to reflect on our judgments, compare them one with another, and judge about them. These reflections of the mind inwards on itself are called "reflex mental acts," and the judgments which the so reflecting mind makes about its own judgments are "reflex judgments." Such difficulty as may be experienced in making these reflections must, however, be got over by any one who would successfully engage in the quest for "truth;" nor will there be much difficulty in getting over it. For this faculty, like our other faculties, may be strengthened by exercise, and all that is ordinarily needed to perfect it is patient perseverance.

Some views as to what truths are most indisputable.

Now, some very estimable persons will tell us that the especially true and most indisputable propositions, are those which can be shown by reasoning to be necessarily true. Others will declare them to be propositions the truth of which has not been impressed upon us by habit or by any association of ideas, but is what they call "a genuine testimony of consciousness," spontaneously arising in the mind of an infant as its intelligence dawns. Some good persons are persuaded that we must select as the truest propositions, those which are not gained by experience and are called *à priori*, or which have been implanted in our nature by a benevolent and all-wise Creator. There are, on the other hand, very able writers who affirm that we cannot pick out any especially indisputable propositions at all, because the whole of our ideas are simply due to mental association, and are the result

of the experiences and prejudices not only of countless generations of mankind, but of an indefinite number of non-human ancestors also.

But one and the same answer must be made to all these different representations. The matters they refer to are very interesting, but the problem we have to solve is one entirely independent of them. It has nothing to do with questions about the origin of our judgments, or with reasonings about their truth. Indeed, no proposition capable of proof can possibly be one the certainty of which is fundamental. For in order to prove anything by reasoning, we must show that it necessarily follows as a consequence from other truths on the truth of which its own truth depends. Such other truths must therefore be deemed more indisputable than the thing they are called in to prove. Evidently we cannot prove everything. However long may be our arguments, we must at last come to ultimate statements which must be taken for granted, as we must take for granted the validity of the process of reasoning itself. If we had to prove either the validity of that process or such ultimate statements, then either we must argue in a circle, or our process of proof must go on for ever without coming to a conclusion. In other words, there could be no such thing as proof at all. Similarly no inquiries concerning the origin of ideas can suffice to point out those which are the least disputable. Valuable and useful as such inquiries are in other ways, they cannot suffice. To be conclusive, they must depend on some general affirmation such as, "No beliefs due to the association of animal feelings, or of ideas, can be most certain truths," or, "Whatever idea is *à priori*, or God-implanted, or manifested in the dawning intelligence of an infant, must be a most certain truth." But since the truth of these propositions themselves is questioned by many persons, whatever depends on them can have no pretensions to be evidently and supremely true.

And, indeed, it is by no means clear why a surpassing keenness of mental vision should be attributed to babies or why our earliest beliefs should be thought less fallible than the beliefs of our maturity. Again, if the outcome

of the first sensations and cognitions of infants are to be taken as the appointed means for revealing to us ultimate truths, why should judgments be necessarily discredited if they come to us by the agency of the yet earlier sensations and cognitions of animal ancestors? Why, again, are beliefs to be considered less certain and ultimate if they be due to the association of sensations and ideas, than if they be due to spontaneous, original impulses? All the phenomena of nature take place according to certain laws, and it is difficult to see why, of the various laws regulating our mental activity, we are to regard those which determine our mental associations as pernicious and misleading in comparison with those which regulate our spontaneous, original beliefs—if any such we have. That a judgment is "God-implanted," is a good reason for accepting it with those who already believe in "an all-wise and benevolent Creator." That it cannot claim universal acceptance, however, is clear from the fact that so many books have been written to refute persons who affirm that we have no sufficient evidence of God's existence, or, at least, of His goodness.

This inquiry refers to the grounds and criterion of beliefs, not to their origin.

But, as before observed, all inquiries into the origin and causes of our beliefs, valuable and interesting as they are for the study of the human mind, are out of place in an inquiry as to what judgments are evidently and supremely certain. The latter inquiry refers to the grounds of belief which any judgment may exhibit in and by itself—to a criterion of its truth—and not at all to the causes which have produced it. Yet there are philosophers who have been so busy in trying to find out how different propositions have come to be believed, that they have neglected the more fundamental inquiry why they should be believed—what grounds of certainty they exhibit. By the "grounds of certainty" which any judgment can show, it is not, of course, meant anything external to it. Such a meaning would imply a proof of the judgment, and would involve us in an endless and resultless series of arguments, as already pointed out. The only ground of certainty which an ultimate and supremely certain judgment can possess, is its self-evidence—its own manifest certainty in and by itself. All proof, or reasoning,

Ultimate truths cannot be proved.

must ultimately rest upon truths which carry with them their own evidence and do not, therefore, need proof. Some persons on first meeting with this assertion may be startled at the suggestion of believing anything whatever on "its own evidence," fancying that it is equivalent to a suggestion that they should believe blindly. This is due to the second of those too mental associations to which attention was called in the earlier part of this chapter, namely, that association which induces a feeling that to believe anything without proof is to believe it blindly, but that we do not believe blindly that which comes to us as the result of a process of reasoning. And yet it is manifest, on reflection, that if it is not blind credulity to believe what is evident to us by means of something else, it must be still less blind to believe that which is directly evident in and by itself! No demonstration of Euclid can be more than "evidently" true, and it is evidence, and evidence alone, which gives certainty to any proposition whatever. But here once more an objection may occur to the reader, for he may naturally object that multitudes of men take as evidently true the most mistaken judgments—as, for example, that a railway carriage in which they are seated is in motion, instead of another really moving beside it; or that it is the motion of the sun itself which causes it to "rise" and "set." But no judgment is to be deemed an evident one unless all readily available tests of its truth have been made use of. We must examine whether it be the opinion of our fellow-men, whether it is supported by the testimony of our senses, or whether the reasoning processes which have been employed to prove it (if the evident judgment be the result of reasoning) are valid. Moreover, no judgment is to be considered as self-evident unless it appears to be so not only at first, but also on reflection afterwards. It must be seen, when we have maturely reflected about it, to be certain without proof. Instances of familiar home truths have been already given, and it is easy enough to give others, such, for example, as the truth that "if we have had the misfortune to lose an eye, we cannot still have the pair we had before such misfortune occurred," or the truth that "a stick three feet long and one thirty-six

Self-evidence is the criterion of truth.

General, or abstract, necessary truths.

inches long are of equal length, because each is a yard long." Truths about any objects different in number—for example, about groups of marbles; as that five marbles and five marbles make ten marbles—may be abstracted or enlarged first into the arithmetical, and afterwards into the algebraical "abstract" truths—five added to five make ten, or $5a + 5a = 10a$. Just so the above two judgments about the two eyes and two sticks may be easily enlarged respectively into the "abstract" propositions: Nothing can, at the same time, both "be and not be," and "things which are equal to the same thing are equal to each other." These two general propositions will, on reflection, be seen, like the particular judgments from which they have been abstracted, to be certain without proof; they may, therefore, be said to be necessarily true or "necessary truths." Reflection will also show that we can have no certainty about anything if those abstract judgments are not absolutely certain. They are therefore truths which are necessary for our intellectual activity.

Three orders of fundamental certainty.

But we have already seen that absolute certainty does exist, and that, as a fact, we may validly argue in its defence. At the root, then, of all certainty, there must lie perceptions of three orders of truths all supremely certain and self-evident, namely, (1) perceptions of a greater or less number of general truths; (2) perceptions of particular facts; and (3) perceptions of the force of some arguments. If we had no certain knowledge of self-evident general truths, advance in knowledge would be absolutely impossible, and we could not argue; for if anything could be and not be at the same time, then something proved might at the same time be unproven. If we had no certain knowledge of any fact—as, for example, that we have some feeling or belief—all our demonstrations would, as it were, remain suspended in the air and have nothing to do with reality; and if there were no reality, there could be no real truth, and therefore no certainty. Lastly, if the truth of some mode of reasoning was not clearly self-evident, we could never arrive at any conclusion, and all argument would be vain. But men of all schools of thought, who argue, show that they do not think all argument vain. The conclusion that any given

man will ultimately die if mortality is the sure lot of all men, is a judgment the certainty of which is seen on reflection as well as at first, and is admitted by the common consent of mankind.

The most certain and indisputable judgments, then, are those which require no proof, but are self-evident. If any reader is still dissatisfied with self-evidence as the one criterion of ultimate truths, let him ask himself what other better criterion, or ground of belief, ultimate truths could possibly have. Any criterion provided as the test of an ultimate judgment must either reside in the judgment itself, and so make it luminously self-evident, or in something external to it. Now, if some criterion external to it, indefinitely more perfect than anything we can think of, had been provided, we could only appreciate it through our perception of it and our judgment about it, and such judgment could not give us certainty unless it was self-evidently true. In this way, instead of being better off, we should but have self-evidence after all—and that once removed—as a criterion. It will be plain on reflection that nothing external—no common consent of mankind, common sense, or testimony—could ever take the place of an ultimate criterion of knowledge, since some judgment of our own mind must always decide for us with respect to the existence and value of such criteria. The principle of evidence, then, is one which is really ultimate, and must be accepted under pain of complete intellectual paralysis. It is incapable of demonstration, since it depends on nothing else. It is constantly assumed unconsciously, and is acted on confidently by every one who reasons. We conform to it without thinking about it, but if we reflect on it we see three good reasons for assenting to it:—(1) The spontaneous and natural tendency of all men constantly to conform to it; (2) the destruction of all our knowledge and the impossibility of thinking logically at all, if we do not admit the legitimacy of the criterion; and (3) the fact that, by admitting it, we gain a foundation for our knowledge (which can thus become a mental cosmos instead of a chaos), and are enabled to progress in science.

Is a better criterion than evidence possible?

Our task, then, in the pursuit of truth itself should be, *The task of*

the inquirer after truth.

first, to discover what general principles, what particular facts, and what methods of reasoning are clearly self-evident, and therefore supremely true. When once these have been as far as possible ascertained, we may next proceed to elucidate by their help those truths, next in rank, which underlie all science, following this up with an examination of the teachings of science itself, in the supreme or highest sense of that word. Having accomplished that task, we shall have done all we can in the direct pursuit of truth, and may leave to the followers of each separate, subordinate science that indirect pursuit of it which consists in the investigation of the several orders of truths with which each separate science deals. All our knowledge must either be self-evident, or must be legitimately deduced from what is self-evident. In our pursuit of truth, our endeavour must be to proceed from the known to the unknown, not, of course, with the expectation of being able ever to know all things, but with a determination not to renounce beforehand the investigation of any problem which may seem to demand inquiry at our hands.

CHAPTER II.

SELF-KNOWLEDGE.

The primary fact of our own continuous existence is known to us with supreme certainty, though, like our feelings, not explicitly so without the aid of reflection. What we first and directly perceive is our own momentary activity, but this perception implicitly contains the knowledge of both our existence and our feelings, which respectively and equally need, for their explicit cognition, a reflex mental act.

First fundamental fact, self-knowledge—This commonly supposed certain—Need of considering arguments against its possibility—What these mean—Some truth in them—Also a false assumption and an error of fact—Mistake as to an implication—Self-knowledge like our knowledge of others—Primary cognitions—An objection—Met by a distinction—Explicit and implicit knowledge—Feelings cannot be known without self-knowledge—Feelings not known prior to self—A fundamental error and its consequences.

IN the preceding chapter an endeavour has been made to bring home to the mind of the reader the truth that the supreme and ultimate criterion of the certainty of any proposition is its own luminous self-evidence. The first task of the inquirer after truth was also declared to be a search for the most certain general principles, facts, and methods of reasoning. The quest of truth, however, is the quest of what is eminently real; and so, to ensure reality, we will begin, not with the consideration of any "abstract principle," but of a "fact."

First fundamental fact, self-knowledge.

It is no unusual thing for a person to exclaim, with reference to something about which he is sure, "I am as certain of it as I am of my own existence;" and the

exclamation is generally understood to denote a very high degree of certainty. The so often quoted Delphic precept, "Know thyself," has been explained in different senses by different writers; but there is just one thing in which all these writers agree, and that is that men *can* know themselves. There are, of course, some unfortunate persons, in a more or less diseased or idiotic state of mind, who, from defect of memory or whatever cause, are unable to recognize their own personal identity. But this book is addressed to reasonable men of ordinary intelligence, and not to those who are wholly or partially out of their minds; and, indeed, a plain man would very naturally consider any one to be "out of his mind" who sincerely professed that he could not know his own existence with entire certainty. It is, therefore, to be feared that some readers may be impatient at meeting with an argument directed to show that we have the fullest reason to be supremely certain of the fact of our own existence. They may at first very naturally feel disinclined to consider reasonings about a matter they have never themselves felt it possible to doubt, even if they have heard that other persons have been so "absurd" as to profess to doubt about it. "To doubt one's existence," they will say, "is even more absurd than to believe that one's limbs are made of glass!" And yet there are two good reasons why no one who would earnestly inquire after truth, should refuse to consider carefully the arguments which follow. The first of these two reasons is that the question concerning the supreme certainty of the fact of our self-knowledge is of fundamental importance for the inquiry after truth. If that certainty cannot be established, then the inquiry after truth may, for reasons hereafter stated, be given up as one essentially insoluble. The second reason is the circumstance that very eminent, highly intellectual men have denied, and do deny, the supreme certainty of our self-knowledge. Now, it is not for a moment to be supposed that such men are insincere, or that they can adhere to a doctrine which does not contain some truth. It will probably, then, be worth while to try and find out what this truth is which they do hold, and to examine whether they have not overlooked some

This commonly supposed certain.

Need of considering arguments against its possibility.

other truth which, if also taken into account, would serve to explain their paradoxical denial of certainty to our self-knowledge. And indeed, as might be expected, these paradoxical assertions do not turn out, when carefully examined, to be so glaringly absurd as they at first sight seem to be. When the supreme certainty of our knowledge of our own existence is denied, the certain existence of the feeling which any person may have at the moment when he says, "I exist," is not thereby denied. What is denied, is the possibility of our having any supreme certainty that one continuous, enduring being, or "self," goes on existing during the succession of what we call its different "feelings." It is fully admitted that we are conscious of our various feelings as they successively arise, but we are said not to be conscious of any continuously existing being which remains essentially unchanged throughout the successive changes of its feelings. Such a being, it is affirmed, we can never know apart from our various "states of feeling;" and, as we can never even know it, we most certainly can never be "supremely certain" about its existence. Supreme certainty, they say, we may indeed have about our present feeling, whatever that may be, but about nothing else; and they deny that we have, or can have, such certainty about our continuous, enduring "self," or "ego," as we have about our "feelings," or, as they are generally termed, our "states of consciousness." A little reflection will show that there is a certain truth in these statements, strange and startling as they may at first sight seem to be. Any one, even unaccustomed to such reflex mental acts,* may easily perceive that he can be absolutely certain about the existence of any feeling—such as, *e.g.*, a feeling of a sweet taste, or of warmth, or of cold—while he is actually feeling it. A little further reflection will show him that the present existence of such a feeling, or "state of consciousness," is so certain that it is absolutely impossible for even any supernatural power, however exalted, to make him think that a feeling does *not* exist while he himself is actually feeling it.

What these mean.

Some truth in them;

In maintaining, then, the absolute certainty of any

* See above, p. 8.

present "feeling" or "state of consciousness" actually present to the mind, the teaching here combated has right and reason on its side. It has also right and reason on its side when it goes on to affirm that we cannot know ourselves apart from our various states of feeling and apart from the different modifications we undergo. The reader will readily enough perceive that he is reading or has ceased to read, as the case may be, but he will never obtain a distinct perception of any essential "self" which is neither doing anything itself nor having anything done to it.

also a false assumption and an error of fact.

In conceding so much it may appear that we have conceded all, but such is by no means the case; for a little patience will enable us to disentangle, in the assertions criticised, one unwarranted assumption and one error of fact. The unwarranted assumption is, that we can know nothing with supreme certainty unless we know it by itself, and apart from any other entity with which it is intimately connected, either temporarily or permanently. The error of fact is, that we can be conscious of the feelings we have, apart from any consciousness of the self which has such feelings. As to the unwarranted presumption, it is so far from being a truth that we can only know a thing by itself, that the very contrary is the case. We can really know no thing by itself. No thing can be known by us except through our simultaneous knowledge of some other thing with which it stands in some relation or other. For example, nothing can be known as large except we know something smaller; or as warm, or sweet, or dark, or rough, except in contrast with things relatively cold, not-sweet, light, or smooth. It would not, then, be by any means wonderful if we only knew ourselves as related with our simultaneously known feelings, or only knew our feelings as related with our simultaneously known selves. As to the error of fact, it is a truth (to the demonstration of which this chapter will be devoted) that what we have just represented as being by no means wonderful, is certainly true. We have not, and cannot have, any more knowledge or perception of our feelings apart from our knowledge and perception of ourselves, than we can have knowledge or

perception of ourselves apart from our knowledge or perception of our feelings.

Indeed here, as in so many other instances, error exists in the form of a mistaken negation, which has been too hastily supposed to be involved in a true affirmation. The true affirmation is, "*We may be supremely and absolutely certain of the existence of present feelings or states of consciousness.*" The mistaken negation, erroneously supposed to be involved in that affirmation is, "*We have no such certainty of the existence of an enduring—i.e. substantial—self, or* ego, *as we have of those 'states of consciousness' which we assume that 'self' to experience.*" Another and complementary truth, then, which the eminent men before referred to have, we believe, overlooked, is the equal certainty which exists between our knowledge (1) of ourselves, and (2) of our feelings, and the impossibility of our knowing either of these, apart and alone. *Mistake as to an implication.*

The erroneous nature of the negation just stated may, we venture to think, be demonstrated as follows: It is quite true—as has been above admitted—that we never do know our own substantial being in its very essence simply, alone and unmodified. From this truth, however, it is not to be inferred (as the men here combated do infer) that we cannot know our substantial, essential being—our enduring "self"—with absolute and supreme certainty. It is not indeed in the least degree wonderful that we never know our own "self" in an entirely unmodified condition because, during our whole lives, it never has been, is, or will be, in such a condition. We never know it except in some "state," but then it never exists or has existed except in some state. In this respect our knowledge of ourselves is like our knowledge of anybody and everybody else. Many readers may have seen, and some have known, the late Lord Beaconsfield. But however intimate and prolonged any one's knowledge of him may have been, it is certain that no one ever knew him except in some "state"—as in the House of Commons or out of it, as speaking or silent, as in motion or at rest, as at home or abroad, as with his hat on or with his hat off—and this for the very good, though obvious, reason that he never did *Self-knowledge like our knowledge of others.*

or could for one moment exist except in some "state" or other. This plain truth, however, in no way prevents any one having very truly and really known him, and known him to be the very same person through various changing states. That none of us have ever known a friend except "in some state" is most true; yet we may have known a friend exceedingly well for all that, and it would not be a little odd if we were to be told we could not really know a friend unless we could know him in a mode in which he never did, and never by any possibility could, exist. Just so it is with the substantial, essential "self" or "ego." Our never having known it except in some "state" in no way prevents our having very really and truly known it. But how do we know this "self" of ours, and what fact about it do we seem to know most certainly and directly? Ordinarily our attention is (as said in the first chapter*) directed to external objects and events, and is very rarely occupied in considering the operations of our own minds. In the morning of life this is especially the case, and young children are occupied exclusively with things external. Nothing can well be more false than the assertion that our knowledge of "states of consciousness" is primary as regards time. It certainly is not primary in chronological order. But is it primary in any order? A little careful consideration of our own feelings and perceptions will, we believe, show that our knowledge of our own mental states—of our feelings—is in no way primary. When our attention is roused to action—when we become aware of anything—what we are primarily and directly conscious of is neither "our mental state" nor yet our own "continuous self" either. We are aware of something being done by us, or being done to us. We have in every case a feeling, and in every case a sense of our own self-existence, but what we know primarily, directly and immediately, is neither the "feeling" nor the "self-existence," but the concrete actual thing then being experienced. We can, indeed, become distinctly and explicitly aware of either the "feeling" or the "self-existence" by turning back our mind upon itself, and making a reflex

Primary cognitions.

* See above, p. 8.

mental act, and mentally saying, "I have such and such a feeling," or, "I now exist." Any one can very readily test the truth of this assertion. Let the reader lay down this book. Having laid it down, let him consider what he was directly conscious of in so doing, and he will see that he was conscious of performing that act. While doing it he will, of course, have remained "himself," and while doing it will also have felt a variety of sensations of touch, effort, and pressure, and of colour, in addition, if he has looked at the book while he was putting it down. Of these sensations and of his own existence he will have been alike conscious, but his direct attention he will find has been neither addressed to "the persistent existence of his own being" nor to the "existence of the various sensations of touch, effort, and pressure," but to the self-action of "laying the book down." Nevertheless he can, if he likes, turn back his mind on itself and note either the "feelings" or the "perception of his own continuous existence" which have, and has, accompanied his act of laying down the book. Moreover, though these "feelings" or "states of consciousness" are not the primary or direct objects of cognition, we must nevertheless experience them in order to have the direct cognition of our own activity. It is their unnoticed presence which brings about that direct cognition, nor can we conceive of any way of obtaining a knowledge of our own being, save by the existence in us of "feelings" or "states of consciousness" of some kind, the presence of which serves to arouse that direct perception of ourselves in action.

As another example, let us suppose that the reader perceives some sweet violets. In perceiving them he is *implicitly* aware both of his own existing self and also of his feelings—the sight and smell of the violets. Nevertheless, his mind will be turned at first neither expressly on his feelings nor expressly on himself, but upon the object consciously perceived. At the same time he may, if he pleases, direct his mind so as to perceive either that he has "a feeling of violet-sweetness," or that it is he himself who has that feeling; in other words, he may direct his mind so as to perceive his "feelings" or his "continuous self-

existence." Again, let us imagine a man in the act of examining his conscience as to his worthiness or unworthiness. What will such a man ask himself? Certainly not anything about his "feelings" as apart from himself, or about "himself" as apart from his feelings or actions. He will ask himself, "What have I done, said, or willed, of this, that, or the other kind?" In such an examination the existence of "states of consciousness" is of course implied, as the existence of the "continuous self" is also implied. Neither, however, is explicitly referred to primarily. What is thus explicitly referred to is the "action of the self" or actual "self-action." To attend either to the "mental states" as such, or to the "enduring self" as such, implies a further deliberate mental act. Nevertheless it is evident that we could not have any knowledge of such past "action of the self," except through the presence of those "mental states," the existence of which is not directly adverted to by us.

An objection.

But some persons may be inclined to deny that there is this distinction between being aware of any "self-action" and being aware of the "feeling" which accompanies it. They may say, "To know that we are conscious of any feeling is nothing more than to attend to it, and is no really fresh act of knowledge. To say first, 'I am hot,' and then, 'I know that I am hot,' is not to make two assertions, but only one. For we cannot feel at all without being conscious of such feeling, and this knowledge of the state of mind or feeling is an essential part of having a feeling at all. To those who assert that in order to know anything we must not only know, but also know that we know, it may be objected that, according to their view, in order to know that we know, we should need to know that we know that we know, and so on for ever, and thus we could never attain any real knowledge at all." In reply to this argument we might, in the first place, dispute the assertion that "we cannot feel without being conscious of such feeling," for though we cannot have true sensations without feeling them in some way, we may receive sensitive impressions whereof we may remain unconscious. Nevertheless as our express object here is to examine

feelings of which we do become aware, the question respecting unnoticed sensations may be allowed to stand over for treatment in a subsequent chapter.*

Met by a distinction

The answer to be here given to the above objection is the following one: When any one says first, "I am hot," and subsequently, "I know that I am hot," he does make two assertions, each of which refers to a separate and distinct fact. The former refers to a direct fact of sensation, the latter refers to a fact of reflex mental activity—the one whereby the knowledge of that direct fact of sensation is recognized. It is by no means, however, here affirmed that such second reflex mental act is at all necessary for real knowledge; otherwise the objection above made—namely, that such reflex acts must be repeated "for ever, so that we can never attain any real knowledge"—would be well founded. Such a second reflex mental act, however, though not necessary for real knowledge, is necessary for a particular kind of real knowledge. We may know indeed directly, and without reflection, that we are hot; but if we desire to have that reflex kind of real knowledge by which we know as a fact that we have that first direct kind of knowledge, then, in order to obtain it, we must of course make such second act, and so on. If we were to make up our minds to obtain a series of twenty such more and more reflex kinds of knowledge, then, of course, we must repeat such acts twenty times over. Certainty attends the direct first act, but not that kind of certainty which one has when one says, "This present state of consciousness exists." After having the first conscious feeling, which by itself is enough to impart knowledge and certainty, a man may expressly advert by one reflex act, to himself as having the feeling, or, by another, to the feeling itself as being felt. These are both implied in the first direct act, though they can only be explicitly recognized by the requisite turning back of the mind in one or other direction. To the statement that "we cannot consciously feel without knowing that we feel," the answer is: we cannot, indeed, so feel without knowing *implicitly* that we feel, though we can so feel without explicitly recognizing the fact. In the very same

Explicit and implicit knowledge.

* See below, ch. xiv. *Memory.*

way also we cannot consciously feel without knowing *implicitly* that we exist and have the feeling, *i.e.* without recognizing implicitly our enduring "self" or "ego," though we can so feel without recognizing ourselves explicitly—as is manifest from the contentions of those who deny the supreme certainty of our self-knowledge. Indeed, our "self-knowledge" and our "knowledge of a present state of consciousness" are, as it were, parallel to each other, and lie on either side of the direct act of consciousness which contains them both implicitly, but neither of them explicitly. Our direct, simple, immediate perception is always, as before said, one of self-modification—in doing, existing, or being acted on—the simple apprehension of some experience of our living being. Not, of course, of the "doing" as "something being done," or of the action as "being an action," or of "one's self" as "one enduring, substantial existence," but of our own concrete activity—of the fact itself, and not of the fact as "being a fact." The "self"—the substantial, continuous being—is indeed, we have already fully admitted, only deliberately perceived and explicitly recognized by reflection. But the "state of consciousness" is itself in the very same case. It is, then, to be positively denied that, in the primary direct mental act, we know the existence of a "feeling" or "state of consciousness" one bit more than we know the existence of the being who has the state. Though both the "self" and the "state" are implicitly contained in that direct act of consciousness (the "self" quite as vividly as the "state"), yet neither the one nor the other is given explicitly in that direct act, nor can be recognized without reflection—without a secondary, separate, reflex act of mind.

Feelings cannot be known without self-knowledge also.

But though we need such a separate mental act for the explicit recognition of either (1) "our enduring self" or (2) our "states of consciousness," yet that law by which we can know nothing singly, prevents our being able to explicitly recognize the one without, at the very same time, implicitly recognizing the other. That we cannot fully know "ourselves" save by a reflex act is true, but that very reflex act which makes us explicitly conscious of our own being, is accompanied by a consciousness of our feelings

also. That we cannot fully know our "feelings" save by a reflex act is also true, but that very reflex act which makes us explicitly conscious of our feelings, is accompanied by a consciousness of the self which has those feelings. Indeed, the word "feeling" is absolutely meaningless for us except with reference to a something which has "feeling;" as the word "self" is meaningless except with reference to something which is "not-self," the notion of which is implicitly contained in the notion of self, as will be more fully pointed out in a subsequent chapter. Thus we trust we have already made plain the fact, the certainty of which is here contended for, namely, that we have equally certain knowledge of "ourselves" and of our "feelings," and that neither can be known apart from the other. If it were true, then, that we cannot know ourselves with certainty because we cannot know ourselves apart from our feelings, it would also be true that we cannot know our feelings with certainty because we cannot know those feelings apart from ourselves. But the fact of our knowledge of our own feelings is conceded on all hands. The fact of our knowledge of ourselves must then be conceded also.

To make our contention still plainer, let us make a further supposition. Let us suppose that a man of ordinary susceptibility has received a slap on the face. What is his immediate, explicit perception? Not that a certain "state of consciousness" exists, nor that there is an "enduring self" which has become newly modified. His direct perception is that he has been struck, and different "feelings" will accompany that perception according to the circumstances of the case. He may then, if he pleases, explicitly examine his "feelings" or explicitly consider "himself" as affected by what has occurred; and, in either case, he will, by so doing, hold up, as it were, to his mind's eye, the "feelings" or the "self," and regard them by that second application of the intellect which we have before termed "reflex." But he cannot so examine his "feelings" without a perception that they are his own, nor examine "himself" without a perception of the more or less vivid feelings which have just been aroused in him.

As a yet further illustration of what we mean, let us imagine a man engaged in a fencing match. Such a man will plainly have his attention directly engaged in the carrying on of the contest. Nevertheless it is no less plain that during all the time he is "parrying," "lunging," etc., he is both conscious of his feelings—his states—and also of himself carrying on the struggle. Yet it is neither his "mental states" nor his "persistent self" which he directly regards, but his concrete activity—what he is doing and what is being done to him. He, indeed (like the man whose face we have supposed to be slapped), may, if he has a natural turn for self-examination, direct his attention from these direct perceptions in order either to analyze his feelings or note his underlying personality. Should he do so, however, a hit from his adversary's foil will be the pretty certain consequence, and may serve to make him aware of the new direction his thoughts have taken.

Once more: To perceive anything we are in the act of doing (*i.e.* to do it consciously, and not as in sleep-walking or reverie) is one thing; to think either about the feeling which may accompany the doing, or about the self which has the feeling, is another, second kind of act. In that second kind of act we may explicitly attend either to the feeling or to the self, both of which, as before insisted on, are perceived implicitly, though not explicitly, in the first or direct act. To say that the explicit recognition of the "feeling" or "state of consciousness" is prior to, or has any greater validity than, the explicit recognition of the "self," is false in fact, and contradicts what our own consciousness tells us about ourselves. We then altogether deny the assertion referred to, and, on the contrary, affirm that our knowledge of our own substantial, continued existence (the "self" or *ego*) is as primary, as fundamental, as certain, as direct, and as infallible, as is our knowledge of the existence of any given "state of consciousness." Who, indeed, can know his "state of consciousness" at any given moment, except by analyzing his direct perception by a reflex act? To know that one "has a feeling," or "is in a state," or even that "a feeling exists," is plainly an act by which no one begins to think. It is evidently a secondary act—an "act

Feelings not known prior to self.

of reflection." No one begins by expressly perceiving his perception a bit more than he begins by expressly adverting to the fact that it is he himself who perceives it. He begins (as before said) by having some other direct perception of acting or being acted on, in which perception both the "self" and the "states of feeling" are implicitly contained. To explicitly note that the "perception" or "feeling" exists, is, at least, just as secondary, just as indirect, just as reflex, and just as posterior an act as it is to explicitly note that the "self" exists which has the perception. We say "at least," but we believe that of the two perceptions—(1) "feelings," and (2) "self"—it is the self which is the *more* prominently given implicitly in our primary cognitions. We believe that a more laboured act of mental digging is requisite to bring explicitly to light the implicit "state," than to disclose the implicit "self" which has that state. Men are continually and promptly adverting to the fact that thoughts, feelings, actions, and sufferings are *their own*, but do not by any means so continually and promptly advert to the fact that the feelings which they experience are *existing feelings*. Therefore one of the greatest and most fundamental errors of our day is the mistake of supposing that we can know our states of feeling or their existence, more certainly, directly, and infallibly than we can know the existence of the substantial, continuous self which has those feelings.

A fundamental error and its consequences.

This great and fundamental error has arisen from a failure to note that though the existence of our feelings may be known with supreme certainty, yet their existence cannot be so known without a certain turning back of the mind on itself, and that this very same process of reflection suffices to give us supreme certainty of our own existence also. A recognition of that existence is indeed a necessary condition for our being able to affirm that there are such things as feelings at all, and—as was said at the beginning of this chapter—if we cannot be certain as to our own existence, our inquiry after truth may be given up as one essentially insoluble. We may give it up because if we can know nothing with certainty but the feeling of the passing moment, then most certainly we can have no

certainty as to arguments or even words which have been used by ourselves or others, and so all reasoning must come to an end. More than this, we can have no certainty even with respect to our own past thoughts and we cannot therefore even think with any profit concerning such a matter as the pursuit of truth; we can but amuse ourselves with idle imaginings devoid alike of any certain aim or any trustworthy guidance. Let us, however, once see clearly—by the aid of such reflections as those offered in the preceding chapter and in this one—that not only does certainty exist, but that we may have complete certainty as to at least one supremely important fact, namely, the fact of our own existence, and most important consequences will follow. The certainty of this fact affords us a firm and solid foundation on which we may erect a temple of truth, and it is on this account that we have with so much—we hope pardonable—reiteration sought to make evident its certainty. How it is that this primary mental fact is so important, and how we may securely advance from it to the acquisition of other certainties to assist us in our quest, the following pages will show; and our next step will be to try and make clear the self-evident certainty of another fact, the certainty of which can be shown to be involved in the certainty we have of our own existence.

CHAPTER III.

MEMORY.

The trustworthiness of our faculty of memory is a second fact which is involved in the primary fact of our self-knowledge. That our faculty of memory is veracious, is a truth which is self-evident, incapable of proof, and cannot be denied without producing absolute scepticism.

Second fundamental fact, the trustworthiness of memory—What the word "memory" denotes—Recollections and reminiscences—Certainty of memory involved in self-knowledge—Truth of memory cannot be proved—A curious fallacy—Absolute scepticism results from the distrust of memory—The objective and subjective—Consequences of memory's truthfulness.

THE two preceding chapters have brought us thus far: "There is such a thing as certainty, and amongst those things which are supremely certain is the fact of our own existence." In our pursuit of truth, we may next consider a second fact, the certainty of which is involved in that of our own persistent and continuous being. This second fact is the trustworthiness of our faculty of memory. But many objections to the unqualified assertion of its trustworthiness will readily occur to the reader's mind. It is obvious that not only may we sometimes fail to recollect events in which we have borne a part, but that we may even fancy some circumstances to have been the very reverse of what in fact they were. We occasionally meet with people in a state of doubt as to whether they had or had not some particular past experience, and with others who feel confident they were witnesses of something which they were never near witnessing—as George the Fourth is said to

Second fundamental fact, the trustworthiness of memory.

have made himself believe that he was present at the battle of Waterloo, or as women have died for their conviction that they had actually ridden through the air on broomsticks. It is plain that individuals may make mistakes as to what they remember, and defects of memory which occasionally occur are very singular and surprising. Thus some persons may lose the recollection of particular parts of speech—as of all adjectives or all pronouns—and others, who have sustained some injury of the head, may find great gaps in their memory of the past, which gaps will gradually close up as they recover from the effects of the damage inflicted on them. But such exceptional phenomena do not tell against the fact of the general trustworthiness of memory.

In the last chapter it was shown that the existence of idiots and of half demented persons unable to recognize their own personal identity, did not tell against the certainty of our self-knowledge generally. It was also declared that this work is addressed to persons of ordinary capacity, and is not intended as a means for remedying any exceptional intellectual deficiency; and this, of course, also applies to any abnormal deficiency in, or perversion of, the power of memory. But an objection which seems at first to have much force in it may be made to memory's truthfulness. It may be said that our recollection as to anything whatever is less trustworthy than is our knowledge of what we are actually experiencing at the moment. Now, it is of course true that our knowledge of many past events is not so absolutely certain as is our knowledge of some present events; but what we are concerned with here is not the trustworthiness of particular facts of memory, but the veracity of our faculty of memory. It is to be freely conceded that individuals may make occasional mistakes as to this or that past event, but the trustworthiness of our faculty of memory, as a faculty, remains absolutely certain notwithstanding. It informs us as to some portions of the past as certainly as our consciousness informs us concerning some portions of the present. Such is the case, since we cannot have, even as to the present, that supreme certainty which accompanies our reflex con-

sideration about anything we may be actually experiencing —as when we say "Now I certainly am hot"—unless our faculty of memory is supremely certain also—as will shortly appear.

Let us first, however, see what the term "memory" really denotes. Evidently we cannot be said to remember anything unless we are conscious that the thing we so remember has been present to our mind on some previous occasion. An image might recur to our imagination a hundred times; but if at each recurrence it seemed to us something altogether new and unconnected with the past, we could not be said to remember it. It would, in fact, be rather an example of extreme "forgetfulness" than of "memory;" though we, of course, should not know that it was such, since we should not know that it had any relation whatever to the past. In "memory," then, there are and must be two distinct elements. The first element is the reproduction before the mind of what has been before it previously, and the second element is the recognition of what is so reproduced as something actually connected with the past. There is yet a further distinction which may be drawn between acts of memory. Every now and then we direct our attention to try and recall something which we know we have for the moment forgotten, and which we instantly recognize when we have managed to recall it to our recollection. But besides this voluntary memory, we are sometimes startled by the flashing into consciousness of something we had forgotten, and which we were so far from trying to recollect, that we were, when it so flashed into consciousness, thinking of something entirely different. A distinction, then, is to be drawn between those acts of memory in which, by a conscious direction of the will, we search for and find something we desire to recollect, and those acts of memory by which we have a spontaneous, unsought reminiscence in consciousness of some past experience. The former class may be conveniently distinguished and spoken of as "*recollections*," and the latter as "*reminiscences*." It is obvious, however, that neither of these kinds of memory can exist without consciousness. No repetition

What the word "memory" denotes.

Recollections and reminiscences.

of a feeling is an act of memory unless we are conscious of it as, not only existing, but as also related to the past. The significance and importance of these remarks will appear later.*

Certainty of memory involved in self-knowledge.

It was said just now that the supreme certainty of our faculty of memory, is a necessary condition for the recognition even of our own present existence. We can, indeed, have that immediate perception of our own present activity which was declared in the last chapter to be direct and primary, but we cannot obviously have the reflex perception, either of our feelings or of ourselves, without trusting our power of memory as to the past. For, however rapid may be our mental processes, no mental act takes place without occupying some period of time,† and when we turn back the mind to consider the perception "self" or the "feelings" involved in our direct perception of self-action, that perception of self-action is and must be already past. We cannot, therefore, know either a present feeling as being a feeling, or the fact of our own existence as being a persistent existence, without trusting our faculty of memory. As, then, we are with reason most absolutely certain of our "own existence" and of our "feelings," it cannot be with less reason that we are also absolutely certain as to the fact of the trustworthiness of our faculty of memory, absolute certainty as to which is necessarily involved in our absolute certainty as to the existence of ourselves and our feelings. These observations are merely offered for the purpose of clearing away any obscurity which may temporarily exist in the reader's mind about a matter, the truth of which will be clearly certain to him when he carefully considers what his own consciousness tells him. Our observations are certainly not offered him as constituting any proof of the veracity of memory, because its veracity is a self-evident truth, and therefore requires no proof. Proof of it is, indeed, impossible, as no process of argument can be carried on except by trusting in memory's veracity.

Truth of memory cannot be proved.

* See below, ch. xiv.

† No mental act takes place in us without the aid of our nervous system, and the rate at which an influence passes along our nervous system varies according to circumstances, and is always very slow compared with the transit of some physical forces, such as electricity, light, etc.

In fact, without trusting memory we could never be certain that any one step taken in a line of argument had been taken, or that the meaning of a proposition, or even of a word, as understood by us at the moment of using it, had the same meaning as it had antecedently had. The trustworthiness of the faculty of memory is, then, one of those things most evidently and supremely true, the search for which was declared in the first chapter to be one of those steps in the pursuit of truth to be taken next after the recognition that such a thing as certainty exists. It is also one of those fundamental facts upon which all our future arguments must be based, and which were, in the same chapter, represented as being at the root of all certainty.

A curious fallacy.

An objection has been made to this view of the self-evidence of memory's veracity, and it has been very strangely declared that we may trust our faculty of memory, not because its certainty is self-evident, but because we learn its trustworthiness by experience. But any one maintaining such a proposition as this, necessarily contradicts himself flatly. Our past experience can have no value whatever for us if we do not trust our memory, by which alone we can possibly tell that we have had any such experience at all. To doubt the veracity of our faculty of memory destroys the value of all experience whatever, and, therefore, he who would maintain that our certainty as to memory is based on experience, must say in effect that "the faculty of memory being by itself untrustworthy, we learn its trustworthiness by what is untrustworthy also," or, in other words, that "we can never have had that thing (namely, trustworthy experience) by having which we have obtained our knowledge of memory's trustworthiness." Surely never was a contradiction more patent, or a fallacy more obvious! What can be the possible value of any experience which we cannot be certain that any one ever had, and which we ourselves can never have had, since we cannot, by the hypothesis, trust our faculty of memory? How can we ever gain experience if we do not trust memory in gaining it? Particular acts of memory may of course be confirmed by experience if the faculty of

memory be already confided in, but in every such instance it must be confided in. Any person who would maintain the above fallacy must profess to place confidence in his present act of memory, because in past instances its truth has been experimentally confirmed, and he can only know that it has been so confirmed by trusting his present memory! Therefore, neither by experience nor in any other way can we prove the trustworthiness of our faculty of memory, which we know for certain without proof. For although our memory by no means vouches for the past with the same force in all cases, yet there are some past events of our lives which our present state of mind tells us we know with certainty. Some things we may know we have forgotten, other things we may not feel clear about, but as to some other things, memory makes them evident to us, as it doubtless makes evident to the reader of this passage that he did begin to read it, and that he was doing something else before he began to read it. Indeed, if we can be certain of nothing past, we cease thereby to be reasonable beings. If we cannot trust our faculty of memory, then all history becomes a mere present dream for us, as also does the whole of physical science. What experiments, what inductions can prove anything if, when we have made them, we cannot be sure such experiments were ever carried on or such inductions drawn? As has been pointed out a short time ago, even our reflex knowledge of our own existence and our own feelings must vanish, if we deny the trustworthiness of memory. Our absolute certainties as to our own past and as to our present experiences (beyond feelings actually being felt at the moment) rest, indeed, upon the same basis, and if we may trust, as we must trust, our reflective consciousness at all, we must also trust our faculty of memory, upon the veracity of which the very use of our reflective consciousness depends. Therefore, to distrust the faculty of memory is to fall necessarily into absolute scepticism, which was shown in the first chapter* to be a very foolish state of mind, and a system which so refutes itself, and is so absurd as to be incapable even of being rationally stated. We are

Absolute scepticism results from distrust of memory.

* See above, p. 7.

therefore compelled to trust, and to practically admit the veracity of, our faculty of memory, even if disposed to verbally deny it. We are compelled to do so by the very constitution of our nature, and we are driven to do so because otherwise all knowledge, all rational speech, all reasoning, and, indeed, all consecutive thought, become impossible. But we do not accept and trust in our memory on account of these reasons, but because it carries with it its own evidence. With respect to the many matters about which we are absolutely certain, we feel spontaneously and without reflection the evident truth of our present knowledge of our own past, and reflection only serves to make that past more clearly, distinctly, and explicitly evident; just as it serves to bring out more clearly, distinctly, and explicitly that primary and direct knowledge of our own feelings and existence, which is implicitly contained in our perceptions.

The objective and subjective.

As has been before pointed out, the natural, spontaneous tendency of the mind, especially in childhood and youth, is not to look inwards upon the mind itself but outwards upon surrounding objects, which objects make various impressions upon the mind of the person who regards them. That person himself is the subject of such actually present impressions which he is directly conscious of as his own present experience. All such direct, present feelings of him who is the subject of them, are spoken of and distinguished as "subjective"—they are states of the subject who feels. Everything which is not a present feeling or state of consciousness is, on the other hand, spoken of and distinguished as "objective." What is objective, then, is not a state of the subject who feels, but is to be understood as something external to his feelings. It is desirable that this distinction between what is "objective" and what is "subjective" should be clearly comprehended, in order that we may be better able to appreciate certain consequences which follow from a recognition of the trustworthiness of our faculty of memory. Whatever we feel, we feel by the help of our senses, and we can be directly conscious of no feelings except those which are being felt at the time we are conscious of them. Thus, all that is felt, and all that

Consequences of memory's truthfulness.

we are immediately and directly conscious of, belongs to the category of what is subjective, and nothing is subjective which we are not thus conscious of. But our own continuous existence, though perceived with certainty, is not felt, and neither it nor our feelings are perceived as such with immediate, direct consciousness. They cannot be so perceived. They cannot be perceived except reflexly, because—as we saw in the last chapter—they need for their distinct recognition the turning back of the mind upon itself, which thus considers its "continuous being," or "its feelings," or both, as the case may be, and holds them up to the mind's eye as objects upon which it looks. They thus belong to the category of what is objective. That they are but states of the mind which regards them does not prevent their being looked at as objects external to that mind, while it is in the act of regarding them, any more than the image seen by one looking at himself in a glass is any the less a thing different from him who looks, because all the time it is really but the reflection of himself which he sees. The reflections of the mind as perceived in direct cognition are present and "subjective," but as recognized by reflection they are things which are past, however recently past. They are thus made objects of contemplation by the mind, and are therefore "objective." Still more, then, must the persistent, continuous self, or *ego*, be "objective," since it never is, and never has been directly perceived, while a recognition of its duration during past time is an essential element of its being perceived at all. We recognize and know these things, as before said, only through memory, by the help of which we are enabled to unite the past with the present, and say, "I am." Now, these two words signify a great deal; they signify that he who utters them recognizes past acts as his own acts, and that a continuous unity (himself) has continued essentially unchanged through a greater or less number of more or less varied experiences. By asserting the trustworthiness of memory we affirm that our intellect has the power of knowing a certain objective existence, and an existence which is not, and cannot be, perceived by our senses, because the senses can only feel what is present

and can never feel what is past. The very fact of feeling anything shows, with absolute certainty, that the thing felt is present. But a very little thought about our faculty of memory shows that by its aid our intellect can perceive with certainty that which is not present—such as some past event of our lives—and that which is not, and never could be felt—namely, our own continuous being. But some one may say that our continuous being can be felt because our own body can be felt, and continuously felt for a considerable time, so that we are under no obligations to memory in recognizing our continuous existence. Our own body can, of course, be felt in different ways at once, and our experiences in feeling it can be indefinitely repeated or prolonged. But each time we feel it, we can but have the present feeling, and, apart from memory and reflex acts of the mind, we cannot know its existence as continuous and enduring. Our persistent body, once more, can easily be felt, but it can never be "felt" as enduring, although it can be "recognized" as enduring by the help of repeated sensations, when these are accompanied by acts of memory and of mental reflection. This power which memory possesses of lifting us, as it were, out of our present selves, and showing us a wide field of things external to our own minds, which things, but for memory, we could never recognize, is a very wonderful power. It is so wonderful that some persons feel tempted by its inexplicable character to doubt the veracity of their faculty of memory, or even to verbally deny it. But, as we have seen, they cannot do so without contradicting themselves, and committing intellectual suicide by falling into the fatuous system of general scepticism. The self-evident truth that our memory is trustworthy is a fact involved in, and absolutely necessary to, the full recognition of the first and most certain of all facts for us—the fact of our own existence.

The certainty of these two preliminary facts being clearly seen, we may next proceed, in our quest for truth, to inquire about those supremely certain general truths or principles which were declared, towards the end of the first chapter, to be so fundamental that, without them, all advance in knowledge is absolutely impossible.

CHAPTER IV.

HOME TRUTHS.

The primary abstract general principle is the law of contradiction, which is self-evident and cannot be denied without involving absolute scepticism. Other self-evident abstract general principles are the axiom about the equality of things equal to a third thing, and the law of causation.

First general principle, the law of contradiction—Difficulties in its acceptation—A mistaken principle proposed in place of it—Denial of the law involves absolute scepticism—An objection—What produces a feeling of uncertainty about the law—Knowledge of universal truths not exceptionally wonderful—Second general principle, an axiom about equality—A fallacious objection—Third general principle, the law of causation—The idea of "power" or "force"—An objection and its answer.

WE have now advanced two distinct preliminary steps in our pursuit of truth; for we have recognized the certainty of two fundamental, self-evident facts, namely, the facts of our own existence, and of memory's trustworthiness. But in our first chapter it was pointed out* that, besides self-evident facts, a perception of two other orders of self-evident truths must lie at the root of all certainty. One of these two orders of truths concerned the force and validity of certain arguments. We shall consider those arguments in the next chapter. The other order of self-evident truths consisted of general, abstract principles or laws, and it is to the consideration of two or three of such laws that we must now address ourselves. It is plain, indeed, that we cannot build up a temple of truth with

* See above, p. 12.

nothing but "facts," however numerous and solid they may be. To do that we also need the aid of luminous general principles to guide us in the arrangement of our facts, and valid reasoning to connect them firmly together. In our endeavour to show clearly that there is such a thing as certainty, some very plain truths were cited,* as examples of matters about which no sane person can doubt; and in explaining the nature of "abstract truths," or "general laws," or "general principles," or "necessary truths," two truths were selected,† which it will suit our purpose to here somewhat dilate upon. The first of these two thus selected abstract truths is called "the law of contradiction," and may be thus expressed: "A thing cannot, at one and the same time, both be and not be." If we reflect upon this truth we shall see that it is an absolute and necessary one—that it must be true even to the remotest regions of space, and that it must be true both for all the ages that have past and for all the ages that are yet to come. But some readers may here once more be tempted to impatience at being asked to reflect about anything, the truth of which is so manifestly undeniable. In deprecation of such impatience, we would again urge the same considerations as we before urged‡ in deprecation of impatience respecting our inquiry as to the possibility of self-knowledge. Other readers may feel discouraged because they do not at once see the universal necessity of the law of contradiction. It is possible that some persons may doubt as to how things in this respect now are in the Dog Star, or how they have been in this part of space during some unimaginable abyss of past time, ages before the beginning of our world's separate existence. It does, indeed, at first seem not a little difficult to believe that a creature of the very limited powers which man possesses can know such a thing as absolute, necessary, and universal truth. How, it may be asked, can a being who, for a few fleeting moments, dwells in an inconspicuous atom of a boundless universe, know that anything whatever is and must be true for all ages, and for every possible region of that universe, however eternally inaccessible to him? At first sight a reasonable modesty

First general principle, the law of contradiction.

Difficulties in its acceptation.

* See above, pp. 6, 7. † See above, p. 12. ‡ See above, p. 16.

seems here to characterize the sceptic, and rash presumption the dogmatist. Nevertheless, if instead of considering this truth in its abstract form, we examine it in one of its concrete instances, its certainty will become clearly manifest. For example, let any one who doubts if something somewhere may not both "be" and "not be," consider whether it is possible for him (according to the illustration before given) both to possess his two eyes here and now, and at the same time to have only one of them; let him also think whether he could do so any better in any other place than the place where he is, or whether it could have been possible for him at any other time which he can conceive of. Again, let him ask himself whether he could both have lived in the reign of Edward III., and yet have never lived at all till the reign of Queen Victoria. He will, surely, then see clearly that this is impossible to him, as also that what is thus impossible for him, is impossible for other men also. But that abstract truth, the law of contradiction just quoted, is but the summing-up in one general expression of all concrete, separate cases of this kind.

Here, however, another objection may occur to the reader. He may say, "It is very true that I cannot imagine having two eyes and only one eye at the same time, and so I must practically acquiesce in the statement that we cannot simultaneously have both eyes and only one, simply because I am compelled thereto by my inability to imagine otherwise." But so to represent the matter, is to represent it not only inadequately but in a mistaken way, the error of which requires to be pointed out, and ought to be clearly seen. It needs to be so seen because this mistaken representation is by some persons considered to be a supreme and ultimate rule of truth, and, in place of the law of contradiction, it has been laid down that "we must accept as true, propositions we cannot help thinking, because we cannot imagine the contrary." But if the reader will reflect over what his mind tells him when it unmistakably pronounces that he cannot, at the same time, both have eyes in his head and not have them, he will see that this perception of his is a clear positive

A mistaken principle proposed in place of it.

perception of incompatibility and consequent positive impossibility. He will not find his mind become a blank, and declare nothing but its own inability to answer, as he will find it do if he asks himself, "What is the disposition of the surface of the invisible side of the moon?" or, "Is the number of the heavenly bodies odd or even?" His mind has indeed been active, and not impotent; it has not declared that it was unable to answer his question, but has declared very clearly that he positively cannot have two eyes and, at the same time, have none, or only one. In other words, it has in this concrete instance, as in every other such instance, implicitly affirmed the law of contradiction. There are many things which we cannot think, merely through an impotence—a negative, passive inability, —to think them; as when we cannot think of all the units one after another, which would make a million. But such an impotence is a very different thing from positively seeing that anything cannot be because it is positively impossible. This truth will be further illustrated when we come to speak of the distinction * between our powers of imagination and of intellectual conception. To say merely, "We cannot conceive the contrary of such proposition," is to make a mere assertion of inability, and is therefore a quite inadequate description of that active power of positive perception which we all act upon when we have to choose between two alternatives. A mere mental impotence will not guide us in our actions, but our actions are constantly guided by our implicit conviction of the truth expressed in the law of contradiction, though we may never in our lives have explicitly recognized it, or ever heard a word about it. The simplest rustic knows that if his wages have been paid to him, they are no longer owing, and that if he has put his cart-horse in the stable, it is no longer between the shafts. The most learned of mankind are, of course, likewise continually guided in like manner, and to such guidance we owe every scientific deduction. If, then, perceptions of the kind were due to a mere mental disability, we might well exclaim, not "Oh, holy simplicity!" but "Oh, most mighty impotence!"

* See below, ch. x., "Imagination and Conception."

The distinction here drawn between positive and negative perceptions as to possibility, we believe to be a most important distinction, which deserves to be very carefully noted. By the former perception we see clearly that a thing is "positively impossible"—an expression often familiarly used. By the latter perception we recognize either merely that a thing is unknown to us, or that it is impossible for us to know it. The former perception refers to the objective * reality of things; the latter refers only to our own actual ignorance, or to our inability to become the subject of such knowledge.

Denial of the law involves absolute scepticism.

If we deny or doubt about the law of contradiction, we are thereby landed in absolute scepticism, which, as we have seen, is absurd. We are so landed because, if we do not admit the validity of that law, then we can be certain of nothing. To have read or heard arguments against that law, which arguments have convinced us of its unsoundness, will then no longer suffice to disprove an assertion that we have also never read and never heard any such arguments at all, and that we are all the time convinced of its soundness. If anything can, at the same time, both be and not be, then nothing can be affirmed as true without the possibility of its being simultaneously untrue, and so we are reduced to a condition of utter intellectual paralysis, whereby no word and no thought can have any definite meaning for us. That nothing can both be and not be at the same time is, then, a positive truth, known to us by its own evidence. It is no mere law of our own minds, but is also a law which applies to all things; for we have seen that it so declares, if it declares anything, in those examples we selected for testing it, and we cannot accept its declarations as both absolutely true and partly false, for to do so would really be to reject it altogether. It plainly declares itself not to be a mere "form of thought" imposed on our intellect, but objectively certain, independently of our intellect. It declares itself to be absolutely and positively true, both universally and necessarily. To regard it, then, as a mere "form of thought" is to fall into utter scepticism, for it is to contradict that, the certainty

* As to the term "objective," see above, p. 35.

of which is most evident to us of all propositions. It is thus a fundamental truth, upon which not only all reasoning depends, but which applies to everything which exists; since we see clearly that even a Supreme and Omnipotent Being could not—however different the existence of such a Being may be from our own—both be and be non-existent.

An objection.

An objection has indeed been made against the truth of the law of contradiction and against every necessary and universal law of the kind, on the ground that such laws may be no more than truths for us—truths regulating our mental processes and controlling our thoughts, but not necessarily holding good for the universe external to us. But this objection is futile, because, as we have seen, what our minds declare is, not that a law exists and that we are passively unable to get beyond it, but that we actively and positively see that the law controls things external also. If anything whatever is declared to us, the real objective validity of the law is declared to us. This objective validity is affirmed by our consciousness as much as anything else is affirmed by it, and if we are to accept the declarations of consciousness at all—that is, if we are to rise out of utter and universal scepticism—we must accept the whole of what each such declaration tells us, and not gratuitously omit part of it or transform it into something else. We have already seen, in our study of memory,* that our mind unquestionably has the power of knowing not only its own states and laws, but also objective existences and conditions, and has, further, the power of recognizing such existences and conditions as being actually objective existences and conditions. What our mind declares is, not that we cannot think that a man's head has been really cut off, and, at the same time, really remains on, but it declares that, in a real world external to us, a man's head could not at one and the same time be both cut off and not cut off; and it also affirms that every sane mind and every being possessed of real intelligence must see that nowhere and at no time could a man's head be both cut off and not cut off at one and the same instant.

* See above, p. 36.

What produces a feeling of uncertainty about the law.

But if this truth is so self-evident and so supremely certain, how is it that any one can have that vague feeling of doubt concerning it, to which we adverted in the beginning of this chapter? There are, in fact, three reasons for this feeling of uncertainty. In the first place, the feeling arises from want of reflection; reflex mental activity being unfamiliar to most men, and practice being needed for its ready use. In the second place, the law is expressed in abstract terms, and it is not nearly so easy for the majority of men to see the truth of an abstract proposition as it is to see the truth of the concrete instances from which such abstract proposition has been derived. There is, however, a third and yet more important reason for the uncertainty which may be felt by those who, for the first time, meet with the abstract expression of the law. This third reason is due to that natural tendency of the mind, which was noticed in our first chapter,* namely, the mind's tendency to associate "a feeling of uncertainty" with "statements about what is remote." Now, nothing could be more "remote" from us than "the most distant regions of space," and "times anterior to the existence of the world." It is no wonder, then, if this feeling of uncertainty is strongly called forth by a reference to such very remote conditions in connection with a law expressed with the most absolute and universal certainty. But it has been shown, in the first chapter, that we are to be guided in our judgments, not by such things as associated feelings, but by the "self-evidence" to our intellect of any proposition it recognizes as a fundamental truth; and that if a proposition is vouched for by that test, it can have no higher. If we were to doubt such a proposition, we should thereby cut the ground from under all certainty whatever.

Knowledge of universal truths not exceptionally wonderful.

It is indeed a wonderful thing that we should be able to know any absolute, necessary and universal truths, but nevertheless this faculty is not so exceptionally wonderful as it at first sight may appear. In fact, our knowledge of universal and necessary truth is not really more mysterious than is the rest of our knowledge. How we get any knowledge at all, how we see objects, how we feel anything, is most myste-

* See above, p. 6.

rious, and all our knowledge, deeply considered, is very wonderful. On the occurrence of certain changes in our bodies, induced by surrounding agencies, we experience "sensations." Through such sensations (actual and remembered) "ideas" are aroused in us, and we perceive what we know to be "external objects." Through our own actions, and by things done to us, we recognize, as was lately shown, both our "feelings" and our own "continuously existing self." Nothing can be more wonderful than our faculty of memory, which gives us absolutely certain knowledge of a continuously existing being—our own personality—the continuousness of which it is impossible for our senses to perceive. Just as we have the power of knowing that personality, so we have the power of perceiving universal and necessary truths when the occasions of knowing them are present. We learn them through experience, as we learn other truths. As, when a mental image arises in our memory, we may become aware it represents a past experience, so, on a given truth entering our minds, we may become aware that it is a necessary one. There is really no more difficulty or mystery in the mind's perceiving that nothing can both be and not be, than there is in our knowing that we have been to Scotland if we have been there, or that a sensation we have is one of warmth when such is the case. The fact is so, and we perceive it to be so; and the act by which we do this is no more really marvellous in one case than in another; or, rather, every act of knowledge is alike marvellous. We know things, and we know that we know them. How we know them is a mystery indeed, but one about which it is idle to speculate, as it is absolutely insoluble. The mystery of intellectual knowledge runs parallel to the mystery of sensation; we feel things savoury, or odorous, or brilliant, or melodious, as the case may be; and, with the aid of the scalpel and the microscope, we may investigate the material conditions of such sensations. But how such conditions can give rise to the feelings themselves, is a mystery which defies our utmost efforts to penetrate. Yet, because we cannot discover this, we never doubt our sensations, and we have as little reason

to doubt our perceptions of necessary, self-evident truths. To doubt them is not to be exceptionally intellectual, but exceptionally foolish. It is to commit intellectual suicide, and sink—as we have seen—into the proximately idiotic condition of absolute scepticism.

Second general principle, an axiom about equality.

Let us now turn to the second of the two abstract general principles given as examples in the first chapter, which was the axiom that "things which are equal to the same thing are equal to each other." As with the former principle (the law of contradiction), so here, if any one has a vague feeling of doubt, his best course will be to think of concrete instances of it. If, for example, two pieces of wood are each found to be just equal in length to a third piece, which is a yard measure, he cannot doubt that the length of the two will be equal, as they will both be just a yard long. Having thought of a variety of such instances of different kinds of equality, let him again consider the abstract law (which is the common expression of the whole of them), and see if it is not evident to his mind that this equality between the equals of a third thing, must positively always and everywhere exist. In our perception of the truth of this law, some other very fundamental perceptions are necessarily involved, as will become obvious at a slight glance of the mind inwards upon itself. Thus it is obvious that this law, as it concerns equality generally, must concern every kind of equality —equality not only between "quantities," but between "qualities" and "relations" also. Two children of the same mother are equally her children, and if she feels an equal love for the two, then each is beloved as much as is the other. It may seem superfluous to state distinctly such mere truisms, but in the pursuit of truth the inquirer has nothing to guide him but his perception that a statement is evidently true, and it is, therefore, necessary to make very sure with respect to each and every step he takes. Things which agree together in quantity, quality, or relation, are so far alike, while they cannot be thought of as "alike" unless they are also thought of as existing and yet distinct; since nothing can really be said to be like itself. Thus in this axiom we have involved the ideas,

"distinctness," "similarity," and "existence"—ideas which will occupy us hereafter,* and which we shall come to see are of the most fundamental character.

A fallacious objection.

But the principle about the equality between things equal to something else, being an axiom of Euclid, leads us on to consider an objection which has been made to our reposing confidence in what our minds seem to tell us about the necessary truths of geometrical laws. Creatures have been imagined living on the surface of a sphere, and devoid of thickness, so that they coincide with that surface, and are able to have experience of length and breadth in curves, but none of heights or depths, or of any straight lines. To such creatures, it has been said, our geometrical necessary truths would not appear "truths" at all. To such creatures "a straight line" could not be, as it is for us, the shortest of all lines, and two parallel lines, if prolonged, would, for them, enclose a space. Therefore the truths which appear to us to be necessary geometrical truths, cannot really be such. To this fanciful objection it may be replied that beings so extraordinarily defective might likely enough be unable to see geometrical truths plainly perceptible to more perfect beings such as ourselves, but that if they could conceive of such things as our "straight" and "parallel" lines at all, then there is nothing to show that they would not also perceive those very necessary truths concerning them which are evident to us. Moreover, the very men who make this fanciful objection, actually show, by making it, that they themselves, in fact, perceive the necessary truth of those geometrical relations the necessity of which they would verbally deny. For how otherwise could they affirm what would or would not be the necessary results attending such imaginary conditions? How could they confidently declare what perceptions such conditions would certainly produce, unless they were themselves absolutely convinced of the validity of the laws regulating the experiences of such beings, and of the certain truth of their own perceptions concerning the actions of such laws? If they affirm the absolute truth of their own representations, they must think that they perceive (and

* See below, ch. x, "Perceptions, Ideas, and Sensations."

they must therefore implicitly assert the existence of) absolute, necessary truth, or else their own argument itself falls to the ground.

Third general principle, the law of causation.

Amongst the most constantly recurring experiences of everyday life are, in the first place, perceptions of effects produced by one thing on another; and, in the second place, inquiries after the causes which may have brought about some occurrence, or the consequences which may follow from it. Somehow or other, whatever may be the reason or origin of it, it is a fact that the notion of "causes" which act, and "effects" which follow from their action, is embedded in our minds, and ever ready to spring up and show itself. Now, this notion of "cause" has led some persons to assert it to be a law of the universe that "every existence must have a cause," and to further affirm that our own minds tell us that such is and must be the case. With good reason, however, it has been replied not only that many persons, after the most careful scrutiny, affirm that they have no internal witness of this kind, but also that the assertion itself must be false, since if every existence has a cause, then God, if he exists, must also have a cause, and that cause must have another cause, and so on for ever. Nevertheless, though our minds are far from seeing the evident truth of the assertion, "everything has a cause," yet we do perceive something or other about causation. Now, if we examine our minds as to what this something is—what they look out for in this respect—it will, we believe, appear that when some change occurs, or when anything strikes us as being a new thing, we always spontaneously look out for its cause. What our minds really seem to us to declare about causation, is in harmony with this natural habit of mankind, and may be thus expressed: "Every new existence is due to some cause." Such a law, or principle, is of course incapable of proof, but its self-evidence is made clear to us both spontaneously and on reflection. It is made clear spontaneously by our very habit of looking for, or recognizing the need of, some cause with respect to any change in things already existing, and for anything which we may recognize as having newly come into being. It is also made clear to us by reflection

as follows: It is manifest that what does not even exist, cannot act. Every cause, then, must be something which exists, and whatever does not exist cannot be a cause. Therefore anything which comes newly into being cannot be caused by itself, because it could not have acted before it was. It must, then, have been brought into being by the agency of something else which was its cause. Every change in a thing which already exists is also, to a certain extent, itself a new existence, since it is a new mode of existence. It cannot, therefore, have been produced by itself, because it is a new mode, and it cannot be a cause before it comes into being at all. It must, then, be due either to some distinct existence, or to some other mode of existence of a thing which already exists. Thus if a door which was open is now shut, it must have been shut by something else—a current of air or what not. If a cat is now awake which was asleep, this must be due either to something external which has awakened it, or to some vital action of its own frame, which has aroused it from its dormant state.

Again, all and every object made known to us by our senses is seen to be necessarily the product of some cause or causes external to itself. This is, of course, most manifestly the case with every product of human art; but no stone which we tread on, or no patch of sand or mud, can have come to be as it is, without antecedent causes and conditions which made it as it is and not otherwise. Not only the more or less complex structure of any solid body, but its size, position, divisibility, and its existence at the time it does exist, are all due to antecedent actions of other things which determined its various conditions of existence. Even a portion of matter which, so far as we know, is not made up of other material substances—such, *e.g.*, as a diamond or a piece of gold—demands a cause for its relations to things around, and for its own size and internal minute conditions; and the latter two circumstances would demand a cause for their being as they might happen to be, even if such a body existed alone by itself in the universe. Everything, then, which can be seen not to have a sufficient cause of its own existence within itself, must

be due to some cause or causes external to it. Only something which is absolutely simple, indivisible, and eternal, can escape from this law of universal causation. This perception of the need of a cause, is not a mere negative condition, due to an impotence on our part to imagine a thing we have never experienced. It is a positive perception. Let the reader test this for himself. Let him examine his own mind and see whether, when he considers the shape of a stone, he finds himself passively and blindly compelled also to imagine something fashioning it, or whether he does not actively and positively perceive that its shape, etc., must have been due to some antecedent cause or causes.

Idea of "power" or "force."

It may be well here at once to direct attention to a very fundamental notion which is implied in the foregoing judgment, namely, the notion of "power" or "force." That such a thing exists we know through the exercise of our own bodily force, or power, and by our power of will. The idea of power is a primary, ultimate idea, which cannot by any mental dissection or self-examination be reduced to more fundamental constituent ideas. Such is the writer's conviction. If the reader thinks otherwise, let him try and ascertain of what more fundamental ideas the idea "power" consists.

An objection and its answer.

But the objective validity of our perception as to the universal truth of the law of causation has been denied on the following grounds: "We have often enough seen one thing or event follow another, but we have never once perceived any inflow of influence of one thing into another; and yet the law of causation implies the existence of such a thing. We have never really seen or felt 'causation,' but only sequences of one kind or another. Therefore there is probably nothing but sequence, and our idea of the inflow of influence in causation is a mere mistake derived from foolishly transferring in imagination to external things, that 'feeling of effort' which we experience in our own actions, such mistake being then perpetuated by custom." But this objection admits of a ready answer: It is quite true that we never see or feel physical causation itself, for the very good reason that it is invisible and intangible. But although

our senses cannot perceive it, our intellect may; and there is one instance at least wherein the inflow and action of causation is distinctly perceptible to us. This is our perception of the inflow of the influence of motives upon our will. When we resolve from some motive to perform an act, we are conscious not merely of the existence of that antecedent state of things, which is named "a motive," and of that consequent which is our "resolve," but also of the motive as something urging us. We know and feel that it is active, and exerting an influence upon us; that it emits, as it were, a force stirring our will. We have also an experience of the force of causation when anything resists our will. In the latter case the influence is antagonistic to an act of will already formed; in the former case, the influence excites towards the formation of such an act of will. So much may be said here in reply to this objection, but we might have adequately met it by simply repeating what was stated so fully in the first chapter concerning the pursuit of truth itself. It was there pointed out, with respect to fundamental truths, that what we have to ask is, not how we came to know them, but whether they are evidently true; not how their truth can be proved, but whether they are self-evident and need no proof. With respect to the "law of causation," we have seen that its truth is borne in upon us by its own evidence, not only spontaneously in each instance of it which comes under our notice, but on reflection also; and the more we reflect, the more we see the evident truth and universal, objective * necessity of the law that every new existence is due to some cause, which is as certain as is the law of contradiction itself; for if that which has as yet no existence could nevertheless be a cause, then it would no longer be the case that nothing can at the same time both be and not be. The declaration of our minds (both spontaneously and on reflection) tells us little about the nature of that cause to which every new existence must be due, save that it must be, in each case, adequate to produce the effects it has produced. Such a cause may itself be some change or new existence, or it may be some-

* See above, p. 43, for a reply to a sceptical objection.

thing of indefinite stability and duration ; as, *e.g.*, a collision between two sidereal bodies may be due to the past existence during an unimaginable time of two such bodies proceeding along paths which ultimately coincide.

After this preliminary inquiry in quest of some self-evident, fundamental truths, we may proceed to address ourselves to the consideration of the self-evident force of some arguments.

CHAPTER V.

REASONING.

Ratiocination can make things known to us which were before unknown, by rendering knowledge actual and explicit, which was before but latent and implied. Such processes of reasoning are valid and absolutely trustworthy.

Some reasoning must be valid—Inference denied to the syllogism—Shown to exist by examples—The syllogism makes implicit truth explicit—Difference between implicit knowledge and actual knowledge—A general principle may be more evident than a concrete example—Force of the word "therefore"—Logic—Inference implies imperfection of the intellect.

As we remarked towards the end of the first chapter,* no one who himself argues, or who listens to or reads, with any serious intention, the arguments of other men, can, without stultifying himself, profess to think that no process of reasoning is valid. If the truth of no mode of reasoning is certainly true, if we can make no valid inference, then all arguments must be useless, and to proffer or to consider them, alike vain. A forced abstinence from reasoning, due to such doubt, would, however, carry with it yet more disastrous consequences; for if we doubt about one self-evident truth, we may doubt about all, and we should thus be landed once more in that absolute scepticism we have seen to be so self-destructive and irrational. But the truth of the "inference" that any given man will die, provided it be true that mortality is the lot of all men, is a statement the truth of which is self-evident. No one can possibly deny its truth, though some persons will

Some reasoning must be valid.

* See above, p. 12.

Inference denied to the syllogism.

deny that it contains any process of "inference." In order to see whether this is the case, let us draw out formally, for examination, the old stock example of the syllogism—with its major and minor premisses, and its conclusion—thus: "All men are mortal. Socrates is a man, therefore Socrates is mortal." Those who object to such reasoning say, "Whoever has said that 'all men are mortal,' has already said that 'Socrates is mortal' also. The so-called 'conclusion,' is therefore but a repetition of part of the major premiss, 'all men are mortal.' Here, then, we really have no inference at all, but merely a restatement. We do not in truth 'conclude' that Socrates is mortal, but we only say over again, with the mention of his name, what was said before without the mention of his name."

Shown to exist by examples.

To test the force of this objection, let us see, by an example, what our meaning is when we declare that any one object belongs to a certain class of objects. Persons ignorant of zoology may fancy that a whale is a fish, but a knowledge of these matters is now so general that few will be surprised to read the statement that "a whale is a beast." Now, when we make this statement, what do we mean? We mean that a whale, in spite of its shape and exclusively marine mode of life, is nevertheless more closely allied in its nature to such creatures as cattle, beasts of prey, etc., than it is to any fishes. Even if we are zoological experts, we do not, in saying "A whale is a beast," distinctly advert in our minds to all those various anatomical conditions which characterize the class of beasts, but only to the fact of the predominance in its organization of the marks which distinguish that class of animals. We can if we choose, however, turn back our mind, and mentally, or verbally, refer to any one of such marks, or characters, and recognize the fact that the whale, inasmuch as it belongs to the class of beasts, must have that particular character so referred to, out of those various marks which are common to the whole class. Thus we may say to ourselves, or others, "The whale, being a beast, must have warm blood." In this manner we bring forward into explicit recognition a character, the existence of which

in the whale was implied in saying it was a beast, but which, nevertheless, was not distinctly present to the mind, may never have been even thought of before, and therefore never actually known—for we cannot be said to know what is not and never has been present to the mind. In saying, then, "All beasts have warm blood. The whale is a beast, therefore the whale has warm blood," a new fact is brought distinctly and explicitly before consciousness which previously was but latent, and so the conclusion of the syllogism does impart knowledge. Thus the syllogism affords fresh knowledge to the mind by bringing about the explicit recognition of a truth which before was implicitly contained in an assertion to the effect that a certain object belongs to a class which has certain attributes. This process of bringing out into clear recognition a matter which before was latent, is a process of "inference" the whole force of which resides in, and is expressed by, the word "therefore," as we shall shortly more clearly see. Let us suppose a person to be looking at some very flexible and soft kind of fish. He may perhaps say to himself, "This creature cannot have any spinal column in it." Then it may strike him that naturalists have classed fishes, together with various other animals, in a great group, one character of which is the possession of a spinal column. He will then further say to himself, "Since it is a fish, it must, however soft and flexible it may be, have a spinal column." Thus he will really obtain by inference the knowledge of a new truth. It may, however, be further objected that by our explanation we have admitted the major premiss to implicitly contain the conclusion. But this further objection, to have any force, must be understood as saying in effect that implicit and explicit knowledge are, at least practically, the same thing. For if "implicit knowledge" is not "actual knowledge," a fact "implicitly contained" in a major premiss is none the more "actually known" on account of its being so contained therein; and manifestly anything which makes "actually known" what before was not actually known, must convey fresh knowledge. There is, indeed, so great a difference between explicit and implicit knowledge that the

The syllogism makes implicit truths, explicit.

Difference between implicit knowledge and actual knowledge.

latter may not really deserve to be called "knowledge" at all. A little consideration will, we think, make this clear beyond all dispute. No one will venture to affirm that a student merely learning the axioms and definitions of Euclid, will, by having done so, have become at once acquainted with all the geometrical truths the work contains, so that he will have no need to study its various propositions and theorems, all of which he will thus know without having once read them. Yet all the propositions about circles, triangles, etc., in his "Euclid" are implicitly contained in the definitions and axioms. Although, then, he knows that mass of geometric truths implicitly, in knowing the definitions and axioms, he does not, for all that, really and actually know them at all. In order that he may come actually to know them he must go through those various processes of "inference" by which the different truths implicitly contained in Euclid's definitions and axioms are brought to the student's knowledge explicitly. There would be much more weight in the assertion that the conclusion of a syllogism is contained in the major premiss, if that premiss were a truth which had been arrived at by an examination of every single instance of the kind referred to in it. For example, if every tree in a certain garden had been examined, and found to be a conifer, then the assertion, "All the trees in that garden are conifers," would be a truth of that kind. It would have been the result of an examination of every fact referred to—or, in other words, it would have been arrived at by what is called "a complete induction." In a syllogism with a proposition of this kind for its major premiss—*e.g.* "All the trees in the garden are conifers. This tree is a tree in the garden, therefore this tree is a conifer"—the conclusion is not contained in that premiss in a merely implicit manner. It is, however, very rarely the case that the major premiss expresses a truth arrived at by a complete induction, and in some sciences, and these chiefly the exact sciences, it is never so. In most cases we arrive at the general principle of our argument—the major premiss—from a consideration of but a few, sometimes but one or two, instances. Thus no one can pretend we know that

"the angles of a triangle are together equal to two right angles," by a complete induction—by an examination of every existing triangle. The examination of a very few triangles suffices to make us aware of that general law. If, then, our attention is directed to a certain triangular figure, and we are asked, "Are its angles equal to two right angles?" we shall not be able at once to answer the question by any direct and immediate perception of the figure as a figure. We can do so, however, indirectly and mediately, through recognizing that it is a triangle, if we already know that the angles of such a figure are always together equal to two right angles. Here, then, we know the conclusion by the help of a major premiss.

A general principle may be more evident than a concrete example.

There is yet another consideration. As a general rule the truth of abstract principles is best brought home to us by a consideration of some concrete instances in point. We have thus, for example, made use of various such instances to illustrate the truth of the principle of contradiction and other abstract, fundamental principles. It sometimes, however, happens, on the other hand, that an abstract general principle is more evident than is a concrete example of it. Thus, let us suppose we are inquiring whether some particular action will be a rightful action for us to do, and that the circumstances connected with the action are very involved and intricate. We may see clearly that a variety of good results will follow from our performing it, which will confer benefits on many people, and these results may so strike us that we may be dazzled by them, and led at first to think it our duty to do it. On further consideration, however, we may see that the action would be essentially an ungrateful action, while we are quite clear that ungrateful actions are wrong actions; and so, by this latter consideration, we shall be led to decide against performing it. Here, then, it is our perception of the relation existing between a particular action and a general principle condemning ingratitude, that enables us to form a clear judgment about the matter, and to decide against performing the action. In such cases it is manifest that the major premiss of a syllogism does bring knowledge to our minds.

Force of the word "therefore."

The objections to syllogistic reasoning which have been now considered, appear, then, to be devoid of all solid foundation, and to be mistaken and misleading. The self-evidence of the proposition that some reasoning is valid, on the other hand, plainly shows itself. It shows itself in that idea of the mind which we express by the word "therefore." When we use the word "therefore," we mean to express by it that there is a truth, the certainty of which is shown through the help of different facts or principles which themselves are known to be true. A slight examination of our own mind will show us that there are many things which become known to us as a consequence of our knowing other things. Thus, from an examination of the composition, contents, and surroundings of a piece of rock, we may come to know that ages ago it formed part of the bed of the sea. The greater part, indeed, of the knowledge we acquire throughout our whole life, is acquired in this indirect way. This process of gaining knowledge indirectly, is the process of "inference," or "drawing conclusions," and the idea expressed by the word "therefore" is contained, whether expressed or not, in every such inference made and conclusion drawn.

Logic.

We are here only concerned to make it clear to the reader that some processes of inference are valid, and not to point out to him what processes of inference are valid. It is the task of logic to show what are the rules for drawing such inferences—whether the inferences are (as in the syllogism) "deductions" as to particular facts, which are inferred from more general truths, or "inductions" as to general laws, which are inferred from particular facts. Logic points out the laws which govern legitimate deduction and induction, because deduction and induction are two departments of human mental activity; for logic may be considered as being both the "science" of the laws of thought, and the "art" directing the fit, practical application of those laws. To obtain guidance, therefore, in the matter of drawing inferences, the reader is referred to the various special works devoted to the exposition of logic. But we are forced, by our mental constitution, to obtain the greater part of our knowledge—as before said—in this roundabout

Inference implies imperfection of the intellect.

way, *i.e.* by processes of inference. Were our intellect of a much higher order, it is conceivable that we might be able to see equally well, and, at the same time, all those truths which a proposition may contain implicitly as well as explicitly, and all those general laws which particular facts may signify. In that case there would be, of course, no process of inference for us. All those truths we are at present compelled to laboriously gather indirectly, by inference, would then be directly evident to us, just as our own activity and as self-evident fundamental truths are self-evident to us now. Having, however, the relatively imperfect natures we have, we must be content with such roundabout, though practically sufficient, methods as those expressed by our valid processes of reasoning. We must be content to change implicit truths into actual knowledge by placing propositions side by side, so that by such juxtaposition we may be able to see explicitly, truths, otherwise invisible to us, which lie hidden beneath them. They are thus brought to the surface, and seen by us to be "therefore" true.

Reasoning, then, is a process which is to be trusted in confidently, when carried on logically according to the laws of thought. It is not, however, and cannot be, the highest kind of act of which our intellect is capable. Such highest act is that by which it recognizes truth directly, without adventitious aid—as when it perceives self-evident facts, and those fundamental principles which we have seen also carry with them their own evidence, and need no proof.

Enough has, we trust, here been said in support of the conviction—so continually acted on by us without reflection—that some processes of reasoning are valid. We will next proceed to pass in review certain other convictions which are the common property of mankind.

CHAPTER VI.

ASSERTIONS AND BELIEFS.

Human testimony and common sense may afford grounds for absolute certainty.

Vulgar opinion may be very mistaken or absolutely true—Human testimony — Common sense — Conditions necessary to its trustworthiness—Grounds of certainty—Uniformity of Nature—Recapitulation of the section's contents.

Vulgar opinion may be very mistaken or absolutely true.

AMONGST the convictions respecting matters of every-day life which are common to men generally, are many which are due to, and rest entirely upon, the assertions of their fellows. Many other convictions seem also to occur to them naturally, without their being able to give any account of them or to defend them, except by saying "common sense shows they must be true." But that there are a multitude of vulgar errors current amongst men, and that egregious credulity is far from uncommon, are both notorious facts. So it may, at first sight, seem reasonable for him who would inquire after what things are the most certain, to leave on one side matters of mere popular opinion and vulgar common sense, as being of a nature too uncertain to deserve his notice. But to be guilty of such neglect would be to make a very great mistake; for propositions of the kind may be matters of complete and absolute certainty and therefore must receive some attention from the student of truth. Human testimony, and the spontaneous judgments of uneducated men, may, under special circumstances, both carry with them evidence, to every well-balanced mind, of their absolute veracity.

Human testimony.

Let us first consider human testimony. That an amount of credence which, to us moderns, seems itself hardly credible, was given in uncritical ages to written and spoken assertions respecting matters of the utmost moment, is a fact with which we are all familiar. Persons who, in the exercise of their profession, have been accustomed to weigh evidence, generally agree that an absolutely correct narration by any witness of a series of events is extremely rare. The untrustworthiness of statements about natural phenomena made by ignorant persons, often becomes ludicrously evident to the man of science, and the main task of our historians is, by careful criticism, to get rid of prevalent delusions due to the mendacity, credulity, or stupidity of their predecessors. In spite of this, no reasonable and well-informed person will deny that he can be forced to believe, with absolute certainty, many matters about which he may have no evidence but that of human testimony. Thus, such a person will not doubt that there was, in 1870, a Franco-German war, or that a revolution took place at Paris in 1848, or that the battle of Waterloo was fought in 1815, and so on. No such person, again, will say he is uncertain whether Sicily is an island; or whether there is a country called Canada; or whether Berlin is the capital of Prussia. When a variety of witnesses of different ages, classes, and interests, uniformly and persistently agree in certifying to a fact not in itself incredible, and one within their competence to testify to, it would be unreasonable to doubt it. For though errors of observation are common enough, yet a number of people thus differing from each other are not likely simultaneously to fall into the very same error of observation; and though many men are liars, yet, in the absence of any common interest, such a variety of people will not concur in telling the same lie. Individuals are liars, and conspiracies to lie are too frequent; but the majority of men do not habitually lie. There is, therefore, a certain probability in favour of the truth of any ordinary assertion, and this probability rapidly increases according to the number and condition of the witnesses who may add their testimony to it.

It has been objected to this last assertion that the

testimony of one witness can only be "probably" true, and therefore the testimony of many witnesses can also be only "probable," since no number of mere "probabilities" added together can make a "certainty," which is a matter of a different kind. But this objection is groundless, for the following reason: the absence of certainty which we may feel with respect to the evidence of one witness, is not necessarily due to any defect on his part, but may spring from our ignorance as to the possibilities of mistake and unveracity, in any single case. These possibilities, however, rapidly diminish with the increase in number and variety of the independent testimonies borne to any one event, on account of the increasing improbability of a general, simultaneous delusion or deceit. It is, therefore, absolutely impossible for all men to unite in telling one and the same lie—indeed, the idea is so absurd that it may seem superfluous to refer to it; but the reference has its utility, as will appear later on.*

The amount and readiness of credence to be given to assertions, varies with the nature of the assertions and the circumstances of the witnesses, according to rules laid down in special treatises devoted to that subject. What concerns us here is, not any inquiry about what testimony we are to accept, or how we are to test it, but simply the recognition of the fact that human testimony may, under special circumstance, afford amply sufficient grounds for absolute and complete certainty.

Common sense.

Let us next consider those convictions which are said to be due to "common sense." Such judgments are not the result of any conscious reasoning process. They are not reflex mental acts,† and do not refer to abstractions, but are clear, direct judgments about definite matters of fact. They, to a certain extent, resemble the instinctive perceptions of animals, and, as is the case with such perceptions, are not peculiar to individuals, but are the common property of the race. Any ordinary, uneducated men, if asked whether the sun may not begin to ascend on some afternoon instead of setting, or whether winter may not come before Michaelmas Day instead of after, will probably think

* See below, ch. xvii., "Ideas of Existence," etc. † See above, p. 3.

that their questioner is either joking or insane, but they will not hesitate as to their own convictions about the sun or the seasons. If pressed to say why they are so certain about such things, they will be pretty sure to reply that to doubt them would be against "common sense." It does not follow that there are not very good reasons for such common sense judgments—reasons which can be logically drawn out—because the men who make the judgments cannot so draw them out. For example, with respect to the sun and the seasons, they might, if better educated, appeal to "the theory of probabilities," "the principle of causality," and "the laws and conditions of the solar system." Thus the judgments of "common sense" may be well grounded and thoroughly scientific, although those who judge do not see how they are so. It is, indeed, this character of being well grounded, without any distinct, conscious knowledge on the part of those who so judge of the grounds of their judgment, which makes them judgments of "common sense." Now, there is a consideration due to recent advances in science, which greatly enhances the value of "common sense," and should specially incline evolutionists to rely on it. We refer to that theory, according to which, the spontaneous tendencies of the individual are the outcome of the past experience of the race and of the various different ancestors of the race. Thus considered, common sense will be seen to enshrine something much greater than the opinion of the individual. It may, then, justly demand respectful consideration (though not slavish subjection), as being the expression of the judgment of many generations of men. Nevertheless, the number of vulgar errors is so great that it is obvious we cannot feel any certain conviction about a "common sense" judgment, except under special circumstances, however much we may be disposed—owing to the consideration just mentioned—to accord it a respectful preliminary hearing. Thus no such judgment can be of the least value if it relates to any matter about which ordinary men would not at once agree. For an opinion cannot be "common" to mankind if the spontaneous judgments of a section of the unreflecting decide against it. It would not invalidate

Conditions necessary to its trustworthiness.

such a judgment, however, if it should be opposed to the views of some speculative philosopher, for such men, as we have seen, have denied the possibility of self-knowledge, and even the principle of contradiction. Secondly, the subject of common assent must not be one of too special a nature to be a fit matter for the uneducated to judge about. Obviously if the subject is one not within the reach of uneducated minds, and not such as plain men may judge of, their judgments about it cannot merit confidence. But though men may arrive at practically true judgments without going through a conscious process of reasoning, no judgment which is contrary to reason can be true, however it may be arrived at. Therefore, in order that any common sense judgment should be accepted as certainly true, it must be able to stand any test of reason, and must overcome any attempt on our part by reflection to resist or avoid it. Lastly, a common sense judgment, in order to be regarded as certain, should concern some matter of real importance, or be connected more or less closely with the conduct of life. It should be so connected if we are to regard it as the product of the constant experience of antecedent races of mankind; for no trifling or unpractical matter could thus constantly impress itself forcibly and uniformly on human consciousness. If, however, all these conditions are fulfilled—if, that is to say, a "common sense" judgment is (1) acquiesced in by all ordinary men, (2) refers to some simple matter, (3) stands the test of reason, and (4) has to do with the conduct of life, then we think it affords one means of certainty. Thus such judgments as, "If a dozen men fire at a target with their eyes shut they will not all hit the centre," or, "If a quantity of printer's type is thrown hap-hazard on the ground, it will not so fall as to form a set of verses," will, we think, be accepted by the reader as judgments which are perfectly certain, and he will probably only object to them on the ground of their triviality. The bringing forward of "trivial examples" and "truisms" seems to us, however, the best, if not the only way of meeting absurd objections, which, if acquiesced in, must lead to absolute scepticism, and so hopelessly block the

way of the inquirer after truth. The trustworthiness, in special circumstances, of "testimony" and of "common sense" are two more facts, perceptions of the truth of which are amongst those lying at the root of all our knowledge. But the disciple of a scepticism much less than "absolute," may profess complete indifference to both "testimony" and judgments of "common sense." The scepticism here referred to is that which would doubt or deny the existence of any external world independent of the individual mind. It is plain that a man who doubts or disbelieves in the existence of his fellow-men, cannot attach any importance to what may delusively appear to be either their judgments or their testimony. To the consideration of this special form of scepticism, termed IDEALISM, the whole of the next section will be devoted, and it is by way of anticipation of the conclusion to which we believe that section will lead, that we venture here provisionally to enumerate "testimony" and "common sense" amongst our grounds of certainty.

Grounds of certainty.

These grounds or causes of fundamental certainty we have seen to belong to three orders of perceptions—perceptions of particular facts, of general principles, and of the force of certain arguments. In considering these three orders of perceptions, we have first treated of two particular facts, namely: (1) self-knowledge, and (2) memory. In the next place we have considered abstract general principles, whereof the most important is (3) the law of contradiction. Then we endeavoured to show the validity of certain processes of (4) reasoning, or inference. Lastly, we have argued that if the independent existence of the world around us be accepted as a truth, then we have two other motives of certainty less fundamental in nature, and which are therefore motives in a subordinate degree. These are: (5) testimony, and (6) common sense, the trustworthiness of which are two additional facts (much less fundamental than those of self-knowledge and memory), our apprehensions of the validity of which lie, as before said, at the root of human knowledge.

Uniformity of Nature.

One of the most important truths which men are consciously or unconsciously possessed of, is that of the

"uniformity of Nature." It is manifest that in everyday life we feel perfect confidence that things will continue in their wonted course. No one throwing up a ball fears that it may never come down again, but spin away to the moon or elsewhere. When we cannot perceive any change in the circumstances attending some action which has often taken place before, we feel sure that, the circumstances remaining similar to what they were, the action will also be like preceding actions of the same kind. This general uniformity in the course of events is vouched for by the common consent of mankind, and abundant testimony can always be obtained that this uniformity has been experienced in the life of every person we may wish to consult. Common sense does not say, and testimony cannot affirm, that this uniformity is positively absolute, for we cannot deny there may sometimes intervene unforeseen or unknown powers or conditions. Nevertheless, the practical certainty that, given the same causes and conditions, the same events will ensue, is universal and confident. Moreover, a basis for this belief exists amongst those fundamental, necessary and universal truths which we have already considered, namely, in the principle of causation.* For any change demands a cause, and no change can ensue without the occurrence of some adequate cause. If, then, there is no difference (*i.e.* no change of conditions) between one set of antecedents and another, there can be no difference between the result in either case. Thus the fact of the uniformity of Nature, reposes both upon testimony and common sense, as also upon that principle of causation which we have seen to be a truth evident in itself.

It is now our task, by the harmonious use of these facts and principles, to go forward in our quest for truth, first by endeavouring to show the reasonableness of the conviction that an external world does really exist (a conviction which all men spontaneously accept and act upon), and afterwards by examining what further leading truths we can elicit through the help of the study of those things we find to be revealed to us by the combined use of our senses, our imagination, and our intellect.

* See above, p. 48.

Recapitulation of the section's contents.

According to the argument carried on in this and the five preceding chapters, it is evident that certainty exists and can be justified to reason, while it is no less clear that absolute scepticism is not only irrational but self-contradictory. Since everything cannot be proved, while yet some things are absolutely certain, it is manifest that there must be truths which are self-evident and need no proof, to believe which is the very reverse of blind belief, since they are believed on the best evidence, namely, self-evidence, than which no other or better test is even conceivably possible for us. At the root of all certainty lie three orders of truths supremely certain and self-evident—an order of facts, an order of principles, and an order of inferences. The primary fact is that of our own self-knowledge. We have direct knowledge of our own being in its activity, whence, by a reflex act, we may observe either our feelings or our continued existence, and we may become as clearly and certainly aware of one of these as of the other. The second fact is that of the trustworthiness of the faculty of memory, the denial of which would involve us in absolute scepticism, while its recognition shows us we can know objective truth—namely, our own past. Amongst absolutely certain general principles, the most fundamental is the law of contradiction—a law so fundamental that it is impossible for any one really to deny it without thereby also asserting it. Geometrical axioms and the law of causation are also truths which are absolute and self-evident. That we should know the self-evidence of these things is wonderful, but not more wonderful than is every kind of knowledge. There are valid and absolutely certain processes of inference which make latent truths manifest. It is plain that if we would reason, or even think correctly, we must accept the practical adequacy of speech to convey thought, and the validity of inferences logically made. We must also admit the value, under the requisite conditions, of human testimony, and recognize the respect due to the common-sense judgments of mankind in ordinary, practical matters of everyday life, about which they may afford grounds for complete certainty when submitted to various necessary, but easy and obvious tests.

SECTION II.

IDEALISM.

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CHAPTER VII.

IDEALISM AND REALISM.

Explanation of these systems.

Need of studying "idealism"—What idealism is—Its attractiveness—"Realism"—Method of procedure.

Need of studying idealism.

A DOUBT as to the real existence of the world about us must seem almost as startlingly unreasonable to him who hears of it for the first time, as the before considered doubt respecting our knowledge of our own existence. That the mountains and rivers of the earth, the plants which clothe its surface, its varied animal population, the busy, teeming world of human life and our own very bodies, the showers and breezes which refresh, the tempests which destroy, and the sun, moon, and stars which variously illumine, all have a real existence in themselves, independently of a mind observing them, seems at first a matter too certain and obvious to admit of a moment's dispute; so that any one who professes to disbelieve it, must be like a man who believes his limbs are made of glass, and more or less of a lunatic. Yet illustrious men of a very high order of intellect, some of them distinguished philosophers and others masters in physical science, have not only professed to doubt this, but have even positively denied either that any independent world exists at all, or that its existence can, by any possibility, be known to us. These leaders of thought have also had a multitude of disciples and followers, and however much masters or pupils may have disagreed in the details of their several views, yet all have had this in common—that they have followed what is called "the

idealist philosophy," according to which nothing can exist independently of its being perceived, and nothing can be known to us save "feelings" and "ideas"—that is, "different states of consciousness." Idealism, then, however unreasonable it may appear or may really be, demands from the student of truth a very careful examination, in deference to those who have adhered to it since it was first propounded by the estimable and ingenious Bishop Berkeley. Nevertheless, though so many men, and amongst them so many distinguished men, have been idealists, we must not forget that after all they form but a very small fraction of mankind, when compared with the enormous mass of human beings who have not been, and are not "idealists." Moreover, the experience we have already attained * in studying the question of "self-knowledge," may help to give us courage in combating the views of men, who if they form so exceedingly small a minority, are yet so eminent and so deservedly respected. In studying the question about "self-knowledge," we saw how it is possible for very superior men to be so dazzled by certain truths they clearly see, as to be led to overlook other complementary truths, a perception of which is necessary in order to avoid most fundamental error. Bearing in mind this experience of ours, we ought to look very carefully at every positive assertion of idealism, in order to see whether, if true, there is not a danger of that truth being so understood as to imply the denial of some other complementary truth. We cannot suppose that eminent thinkers can mistake mere fiction for truth; but, from our former experience, we may deem it very possible for them to take an incomplete view of truth. Should it turn out that such an incomplete, and therefore fallacious, view of some fundamental proposition has gained acceptance, it would be no wonder that an elaborate, false system should have been built up by acute minds reasoning logically from false premisses. Nevertheless, no elaborate system of the kind would have found so many supporters as Berkeley's idealism has found, unless it had had some very special attractions. And, in fact, idealism, as originally propounded, had three very great

* See above, p. 16.

attractions, while another special attraction attends a modern modification of that system. The attractiveness of idealism, and the fact that it concerns the whole universe external to our own minds, thus combine to make it absolutely necessary that it should be carefully and dispassionately considered by us.

What idealism is

That system may be represented by a believer in it, as follows: "Everything known to us, except our own minds, is known to us through our senses. If we examine any object, such, for example, as an orange, we can only know it through the 'impressions' or 'sensations' which we have, and which we believe it excites in us. We see a definitely shaped patch of colour, and that is a sensation we have. If we take the orange in our hand, we feel a certain smoothness and coldness; these are two other sensations of ours. We may grasp it and slightly squeeze it, and so feel that it is more or less solid and rounded; and these feelings are nothing but certain sensations of muscular tension and effort on our part. We may tap it with the ends of our fingers, or throw it on the ground, and so occasion sounds, which again are nothing but sensations we feel; and in the same way, if we smell it and taste it, we shall thereby have two other kinds of sensations—two other states of our own mental being. We cannot, by examining any so-called material object, arrive at anything more than modifications of our own mental states—different feelings. Other feelings we have, indeed, of a less vivid kind. These, however, are nothing but faint revivals of sensations previously experienced, or feelings of the modes in which such previously experienced feelings have stood one to another. Such 'faint revivals' and 'faint feelings of modes of sensation' we call 'ideas.' These vivid and faint feelings are the only things which can be perceived by us, and the whole of our knowledge consists of nothing else. Therefore, as far as we know, nothing exists, or can exist, except as something felt and perceived. We cannot conceive anything otherwise existing, and therefore the very essence of 'existence' must consist in 'being perceived.' Evidently an 'idea' or a 'sensation' can be like nothing but an idea or a sensation. A colour, taste, smell, or

shape, can be like nothing but a colour, taste, smell, or shape. We can have no experience and no knowledge of anything in any object, *e.g.* in an orange, which exists underneath (so to speak) its extension, solidity, shape, colour, smell, and taste, and which supports these qualities, but which itself can never by any possibility be perceived. What idealism denies, therefore, is not the existence of that which we really perceive and which we habitually call 'external things.' It only denies the existence of a something underlying what we call external things, and which fancied something, cannot be felt or attained to by any of our senses. If when ordinary people speak of 'a thing in itself,' they mean to refer to what they actually perceive, and which is really nothing but a bundle of sensations, then they are idealists all the time without knowing it, as idealism fully accepts the existence of such things in themselves. Idealism does not contest the existence of any one thing that we can apprehend either by sensation or reflection. That things which we see with our eyes and touch with our hands do really exist, it professes in no way to question. It professes only to deny the existence in things of an unknown and unknowable underlying 'substance' which supports the qualities which our senses perceive. In denying the existence of this unknowable 'substance,' it really deprives men of nothing which they can even imagine, and therefore of nothing which they will really miss. If the word 'substance' be taken, in the vulgar sense, for a combination of separable qualities, such as extension, solidity, weight, etc., this idealism cannot be accused of taking away. But if it be taken, in the philosophic sense, for something external to the mind which supports those qualities, the existence of which are recognized by the mind; then idealism may be accused of taking that away, if one may be said to take away a thing which never had any existence even in the imagination. Far from inculcating any disbelief in the senses or in what the senses tell us, idealism attaches the highest value to the senses and their teaching. It no more doubts the existence of what is seen, heard, or felt, than it doubts the existence of the mind which sees, hears, or feels.

Nothing, therefore, can be more absurd than the criticisms of those persons who say that idealists, to be consistent, ought to run up against lamp-posts, fall into ditches, and commit other absurdities of the kind. Idealism is not only a thoroughly logical system, but also one quite in harmony with everyday life, its perceptions, and its duties. It is obvious that we can never get outside ourselves. We can only know our sensations and ideas. The existence of these sensations and ideas is sufficient to explain our whole experience, and we are not idly to suppose that other things exist when such 'other things' are altogether superfluous for explaining any of the phenomena we are, or can become, acquainted with. As we cannot know anything beyond our own ideas, why should we affirm that there is anything beyond them? It is impossible for us to even imagine anything existing unperceived. We cannot imagine matter existing in the absence of mind, for in the very act of imagining it we are compelled to imagine some one perceiving it. It is, of course, easy enough to imagine trees in a park or books in a library, and nobody by to perceive them. But so to do, is only to form in the mind certain ideas which we call books and trees and at the same time to omit to form the idea of any one perceiving them. But the person so imagining them must himself be thinking of them all the while. To show, or even know, that anything could exist independently of the mind, it would be necessary to be able to perceive it while it remained unperceived, or to think of it while at the same time it remained unthought of, which would be a manifestly absurd contradiction and impossibility. Idealism thus does not contradict the assertions of common sense, or cause any practical inconvenience to him who holds to it, seeing that it only denies the truth of what is, in fact, but a philosophical superstition—a groundless and utterly superfluous belief in a necessarily unknown and unimaginable substance, about which our senses tell us absolutely nothing."

Its attractiveness.

Such is idealism, as advocated by its supporters, and from such a representation of its asserted claims on our acceptance, it is easy to see how attractive it must be to many minds. For, in the first place, it can be very readily

understood. No difficult and sustained acts of mental introspection are needed for its comprehension. For this it suffices to understand the distinction, ordinarily supposed to exist, between "things" and their "qualities;" to recognize that no "things" can become known to us except through their "qualities," and, lastly, to recollect that we can only know their "qualities" by experiencing "sensations." These conditions being borne in mind, it becomes obvious that if any supernatural being could play at will and indefinitely on our sensitive powers, such a being, by exciting certain sensations, could induce in us a mistaken belief that external bodies existed, which bodies possessed certain qualities. Secondly, idealism is attractive because correct reasoning is welcome to our intellectual nature, and most of its reasoning is very correct and logical, and follows necessarily from what we believe to be the defective premisses, and therefore fallacious assumption, with which it starts. Thirdly, idealism is attractive because it seems to carry its adherent into an intellectual region greatly above that of common men, while all the time it causes him no practical inconvenience, for he fancies himself able to breathe and move in that elevated atmosphere as freely as do those who "grovel" in the common belief of the independent existence of things about them. It seems to cause him no practical inconvenience because it boasts (though not with truth) that "it does not contradict the assertions of common sense, but only denies the truth of a philosophical superstition."

According to the teaching of the original propounder of idealism, all our sensations and ideas are due to the direct action of God upon our minds, and the whole phantasmagoria we call the universe around us, is the product of the energy of the Divine Mind acting upon our minds. But Berkeley's system has not been adhered to in its purity, and is now hardly accepted by any one. Modifications of it which have of late become popular in England, accept in one or other sense a sort of belief in the independent existence of things about us, while denying that we can have any true knowledge of them, and affirming that we can know really nothing but variously grouped

bundles of our own feelings. This special modification of idealism is peculiarly attractive to many men, because it supplies them with sceptical arguments ready to hand against any view they may wish to oppose, without their feeling forced to apply the same sceptical arguments against any system of physical science which they may be inclined to favour. The peculiarly illogical character of this form of idealism it will be our endeavour clearly to point out in the eleventh chapter.

Realism.

The opposite system to idealism—the truth of which we will do our best to prove in the present section of this work—may be stated as follows: "All the different bodies and substances of the universe about us really exist independently of the mind, and with equal reality, whether they be perceived or not. Our senses make us aware not merely of our sensations, but also, and more directly, of the real, independent existence of such bodies, and acquaint us with their objective qualities. Our sensations themselves, though, of course, only subjective, yet serve to make known to us the truth about objective existences—'things in themselves.' Our perception of objects does not in any way essentially alter them. External material objects exist independently of us, and are unlike the sensations they excite in us, while such sensations none the less produce in us perceptions which are like the objective properties of such material, external objects. Reason assures us that, in our pursuit of truth, we may repose securely on that spontaneous trust in the truthfulness of our natural faculties (when matured and employed with due care and attention) which is natural to us. We may also be absolutely certain that an external world really exists independently of us, and that its various parts really possess these very powers and properties which our senses and our reason combine to assure us such objects do, in fact, possess." This system is now commonly spoken of as "realism." *

Method of procedure.

Such are the two systems, standing in direct opposition to each other, the truth of which we have now to examine,

* The word "realism" had originally, and still often has, a very different signification, as will be pointed out in the section on Science. See below, Sect. V., chap. xxv.

and, if possible, arrive at a certain conclusion about. In considering this great problem, we shall first examine the relation it bears to physical science—which has made such wonderful progress since the time when idealism was propounded by Berkeley. The result of that examination will, we believe, be to show that idealism cannot be held by followers of physical science, except at the cost of their mental consistency. Those physicists who believe they see truth in idealism must, in fact, hold two sets of truths—one set having to do with that system, and the other set having to do with physical science. They must thus, if we are right, maintain the truth of propositions which contradict each other, and this without being able in any way to reconcile them or remove the contradiction.

We shall next endeavour to show that all which idealists positively affirm is true, but that they fail to perceive another complementary truth, the neglect of which vitiates their system, and causes it not only to conflict with physical science, but with common sense also. In this contention we shall have to deal with what we believe to be the fundamental error of idealism and the fundamental truth of realism. All that will afterwards remain for us to do will be to consider, with as much care and thoroughness as possible, the various objections which have been brought against the validity of our natural and spontaneous persuasion that the external world has a real, independent existence. While passing these various objections in review, we shall find occasion to illustrate idealism more fully than we have been able to do in the brief statement given in this chapter, and, finally, we shall do our best to point out some of the special faults and inconsistencies of those modifications of idealism which have of late obtained a greater or less degree of popularity amongst us. This will conclude the second section of our book. Succeeding sections will be devoted to a consideration of the leading features of that world, the real and independent existence of which we are now endeavouring to make evident.

CHAPTER VIII.

IDEALISM AND SCIENCE.

A belief in idealism conflicts with the physical sciences in so far as they are concerned with the causes of phenomena.

Idealism consistent with many simple perceptions—Physical science concerns the causes of our perceptions—Examples of scientific prediction—Astronomy—Biology—Evolution—Common sense and "idealism."

Idealism consistent with many simple perceptions.

STRANGE as it may at first sight appear to be, it is none the less true that very many of our ordinary, everyday perceptions and experiences fully admit of being expressed in idealist phraseology, according to the explanations given of it* by its supposed advocate in the foregoing chapter. Stranger still, the idealist representation of these simple experiences of ours is not only easily expressed, but the actual truths of that representation cannot be successfully contested if our perceptions really are, what idealists say they are, perceptions of our own ideas and sensations only. Advocates of idealism mostly confine themselves, as did Bishop Berkeley, to combating objections drawn from a consideration of our ordinary simple perceptions. They speak of perceptions such as our perceptions of an orange with its various sensible properties, or they discuss our imagination of such things as "a park with trees," or "a library with books," and so on.† This mode of procedure was natural, because those who endeavoured to refute idealism made use of objections drawn from a consideration of such simple matters. If physical science was

* See above, p. 73. † See above, p. 75.

merely made up of catalogues of phenomena, simultaneous and successive, of different kinds, the mere number and complexity of those phenomena, however prodigious, would not suffice to make idealist phraseology inapplicable to such science. If an orange may be but a bundle of feelings of different kinds, then the whole contents of a museum, of a geographical region, or of the whole solar system, may also be of similar nature and composition. Physical science, however, is something very different from a collection of catalogues of phenomena. It is a systematic investigation as to what are the causes of different phenomena, and it is also its task to try and explain how such causes act. It appeals, in justification of its declarations about causes, to its own successful predictions, and it is accepted just because its various predictions have again and again been justified by the event. Physical science, therefore, not only has to do with our perceptions, but with the causes of our perceptions. It says not only that we shall have experiences which we call "perceiving new bodies," or "new conditions of bodies," but how and why we shall come to have them.

Physical science concerns the causes of our perceptions.

A prediction like the famed one of Leverrier, affords a striking example of scientific foresight, based on a belief in material bodies acting as causes and acting in a certain manner. Leverrier, by his observations of the planet Uranus—then thought to be the planet most distant from the centre of the solar system—felt sure that its movements must be influenced by the presence of another considerable, but yet unobserved, planet, still more distant from the sun. He also predicted, from a study of those movements, that this as yet unseen planet would be found in a particular place in the heavens at a particular time; and upon the telescope being made use of accordingly, that predicted body was actually for the first time seen, which is now known as the planet Neptune.

Examples of scientific prediction: astronomy.

Astronomical science in this instance declared not only that we should perceive, under certain conditions, a new body, or, in idealist phraseology, "a new group of feelings," but also how and why we should perceive it. Evidently it really asserted what were the antecedent causes and the

actions of such causes, independently altogether of their being perceived or not perceived. Leverrier's anticipation about Neptune reposed on a conviction of the existence of really existing, independent, extended, material bodies with certain powers, including a really existing force of gravity exerted between Neptune and Uranus, modifying their motions. Let us try to express this in idealist phraseology: The presence of a certain group of feelings I call "Uranus" is accompanied by certain other feelings I call "its movements," and these are succeeded in me by a set of faint feelings I name "an idea of the influence of an external unknown body," together with "a feeling of anticipation" and ideas I call "a particular direction," and "at a particular time." These are again succeeded by other groups of feelings which I call "looking through a telescope at the time and in the direction thought of," after which occurs a final group of feelings which I describe as "seeing the new and predicted planet Neptune."

Over and above the grotesqueness of such modes of expression, which no man of science will feel really and truly portrays his own past mental experience, it is to be remarked that they do not at all represent the facts of the case. The idealist phraseology puts before us only groups of feelings which co-exist or succeed arbitrarily and without any rational order or any evident reason why they should so co-exist or succeed. The idealist cannot say why the group of feelings he calls "the movements of Uranus" should be related to another set of feelings, distinguished as "the influence of an external body," or why the feelings known as "looking through the telescope" should be succeeded by those called "seeing the planet Neptune." If nothing exists but feelings, and some unperceived first cause or agent—whether God or some other existence—which alone produces them, then everything must depend on the action of that agent, and all secondary causes and interactions, such as those by which one body is supposed to act on another, can be nothing but deceitful, illusory appearances. But since physical science largely consists in a search after secondary causes and the laws of the interaction of bodies one on the other, a system which can take

no account of either, must be simply fatal to physical science. It would seem, then, that though men of science may be idealists, they cannot be so *as* men of science. While advocating idealism, they must for a time ignore their science; and while pursuing physical science, they must temporarily disregard their idealism, and make use of the hypothesis of the real independent existence of bodies which alone harmonizes with the teaching of astronomy as exemplified by Leverrier's prediction about the planet Neptune.

Biology. The study of living creatures also affords various instructive instances of scientific prediction. A memorable instance of the kind occurred in the career of the great French naturalist, George Cuvier. Amongst the many fossil remains found by him in the vicinity of Paris, was the fossil skeleton of a small beast, embedded for the most part in rock, but with a certain portion of the lower jaw (termed the "angle") exposed. This was bent inwards in a way common to almost all opossums *—animals which also possess two bones imbedded in the flesh of the belly and known to anatomists as "marsupial bones." From his knowledge that these two characters generally went together, Cuvier predicted that a pair of marsupial bones would be found, when that part of the stone which then enclosed the abdominal region of the beast so found by him, should be chiselled away. He invited some friends to be present at the operation, and succeeded in laying bare before them the two bones, the discovery of which he had predicted. But no cause for this co-existence of parts could then or can even now be assigned. A subsequent discovery, therefore, is more germane to the present question. In former times some beasts of vast bulk lived in South America (the megatherium and the mylodon), which more resemble in structure those small existing animals known as "sloths" than they resemble any others. Now, sloths pass their lives hanging, back downwards, from the branches of trees (to which they cling by their four hook-like paws), and the leaves of which they feed on. But the huge extinct animals allied to sloths were evidently too bulky to hang from trees, yet their

* See below, chap. xxi.

teeth showed they also fed upon leaves. How did they obtain them? Sir Richard Owen most sagaciously solved this problem. Having duly regarded the rugged outline of the bones of the hind limbs and tail, which indicated the vast masses of muscle which once clothed them, he suggested that these animals had been in the habit of rearing themselves on their hind limbs and tail as on a tripod, and then pulling trees down to feed on their leaves. It was objected to this theory that with such habits these animals would be very apt to get their heads broken by falling trees. Sir Richard thereupon re-examined the head of the mylodon which had been the subject of his investigations and conjectures, and he found that its head had been broken. He also found that the skull of the animal was so constructed as to enable it to endure such fractures with very little inconvenience. Is it possible to relate this circumstance in terms of idealism, without so transforming its significance as to make it mean something altogether different from what was meant by Sir Richard Owen when expounding his views, and what was understood by his hearers when listening to his exposition? Evidently the "falling tree" referred to hypothetically may be thought of as a "plexus of faint feelings," and the fractured skull actually seen may be considered a "plexus of vivid feelings;" but in this way we lose the entire idea of the causation of the fracture by the fall, and the whole point and meaning of Sir Richard's sagacious inference would be thereby missed.

Moreover, according to that inference, the actions of the extinct mylodon and the risks it ran from falling trees, were supposed to be quite independent of any mind perceiving such actions, even if they did not exist at a period anterior to any possible human observation of them whatever. Physical science declares to us not only what we shall perceive under certain conditions, but also, as was just now said, how it comes about that we shall perceive it, and what are the antecedent causes and their actions, independently altogether of anybody perceiving them. It tells us, indeed, *Evolution.* that there was a time when there were no minds to perceive, and that, nevertheless, the interaction of physical

causes went on till, after an unimaginable series of ages, the world became fit for animal life, and, ultimately, for mind to find a place on its surface. According to that view of nature which has now met with such general acceptance, and which is known as "the theory of evolution," this world was at first, for a prodigious period of time, the theatre of physical forces only; subsequently life began to appear where before no life was, and as ages have succeeded to ages, higher forms of life, both vegetable and animal, came into being. After the land and waters had teemed with life for a vast period of time, an age of reptiles, it is declared, preceded the age of beasts. Then huge marine reptilian forms occupied the place afterwards filled by whales and porpoises; the air vibrated with the rapid strokes of the wings of flying reptiles, while others more huge than the rhinoceroses of to-day, browsed on the foliage of its trees or hunted down and slew the less agile vegetable feeders. All this at last came to an end with the deposition of what are now our familiar chalk downs, and since that time a great variety of beasts have come into being and perished without leaving a trace behind, although a fraction of those which have become extinct are now known to us as fossil forms. Genus succeeded to genus and species to species; the gigantic long-armed ape wandered over the south of France, and many kinds of monkey chattered in the woods of what we now know as Greece. At last the human form made its appearance on the scene, and then came races destined to dwell for centuries in caves, rudely chipping flints for weapons, but by degrees exhibiting signs of an innate love for art. They had with difficulty to hold their own against the cave bear, tiger, hyæna, and other such formidable foes before they were succeeded by other races, and these by others, till the dawn of history appeared for us, the remote successors of those more primitive races of mankind. Such is the teaching of evolution and of science. How is it possible to state all these relations and conditions in the language of idealism? If idealism were true, evolution would indeed be a mere dream, and the whole of physical science also.

Common sense and idealism.

But is the boast of idealism, that it in no way conflicts

with "common sense," justifiable? Is it true that it only deprives the ordinary man of what he will never miss, or does the matter in dispute concern such ordinary man more nearly than idealists would have us believe? Would the world, as understood by common people, be revolutionized, if not destroyed altogether, should idealists be right? It is true that we can express simple perceptions, whether simultaneous or successive, in idealistic phrase; but ordinary men, in the exercise of their "common sense," have to do with something more than such simple perceptions. There is, in fact, no real distinction of kind between scientific knowledge and ordinary knowledge. The pursuit of science is but a pursuit of knowledge conducted with especial care, and according to rules dictated by reason and experience. In ordinary life, just as in science, we seek to know causes and to understand as best we may the ways in which they act. Conceptions of the causal action of one thing on another, and of different modes of such action, abound in ordinary speech and the mental habits of everyday life. Every artisan or sportsman who discusses the utility of tools or weapons or methods of procedure, gives evidence of this fact.

We have drawn out at some length the inconsistency of idealism with physical science in order to show more plainly its inconsistency with the dictates also of common sense, which are nothing essentially different from the dictates of science. Let the reader judge for himself whether or not idealism would or would not deprive him of an essential element of his daily life, if it could deprive him of his perceptions of the causal relations of bodies. Let him consider whether a world, deprived of such relations, would not be for him a world revolutionized, or rather, whether the world, as he knows it, would not be thereby entirely destroyed. Some persons may reply that we ought to be grateful to idealism for doing away with this notion of the action of causes, seeing that it is a mere delusion, since all we can see is that one thing follows another, and not that it exercises any real influence over it. This reply we have already discussed,* and shall refer to again,† but a short answer

* See above, pp. 48–51. † See below, chap. xviii.

may here suffice. Our present object is not to justify the conceptions either of common sense or of physical science, but to see whether or not idealism accords with them. Now, such a reply as that we are considering, would at once annihilate the pretension of idealists that their system does not conflict with common sense, and would show idealism to be a system incapable of admitting an idea of daily use amongst mankind, which is bound up with our conception of the world, and is essential to the progress of physical science. The beliefs of ordinary men and the conceptions made use of by physical science are thus bound up together, and "realism" justifies both alike. But to *justify* the conceptions of science will not, of course, help us to understand the conceptions of those men of science who profess idealism. To try and explain the contradiction which exists between their idealism and their science is the task to which we have next to apply ourselves. In the following chapter we shall endeavour to reconcile the seemingly inconsistent truths thus simultaneously held, by the aid of what we believe to be a complementary truth which has been too generally neglected.

CHAPTER IX.

THE KEY OF THE POSITION.

We have a direct and immediate knowledge of objects which are made present to the intellect by the action of the senses, and we can obtain a certain knowledge of matters of which the senses can take no cognizance.

The truth in idealism—Complementary truth—Sensations the means, not the object, of perception—Two elements in perception—True meaning of "represent"—Perception not inference—What so-called "unconscious inference" is—Perception certified by attention.

The truth in idealism.

IDEALISTS are perfectly right in saying that we can know nothing except through our sensations, and that a plexus of our own feelings forms for us every external object which we think we perceive or know. Moreover, not only is it true that our knowledge of everything we perceive is thus constituted, but it is also true that we can neither imagine nor conceive of anything, however abstract or elevated the object imagined or conceived of may seem to us to be, except by the help of sensations, or of feelings and imaginations which are the result of antecedently felt sensations.* The truth of the first assertion is unquestionable; for it is obvious that we can perceive no object except by our means of perception; that we have no means of perception apart from our sense organs; and that these can act for us in no other way than by affording us sensations, either vivid or faint. The truth of the second assertion the reader should test for himself. Let him examine again and again the most refined or abstract idea he can think of, and let him see whether he has not in his mind,

* See also below, chap. xv.

while thinking of it, the imagination of some object which has before been present to his senses—some feeling, or some group of feelings. If he tries to think of "heat," or "light," he will find that there arises in his imagination more or less vague and transient reminiscences of impressions he has received from warm or luminous bodies. If he tries to fix his mind on the conception, "God," he will see that some mental image accompanies the presence of that idea; it may be that of a venerable human figure, or of light issuing from a cloud, or of a luminous triangle, or of the letters G O D, or of the sound of the spoken word—according as images of one or other kind may have become associated in his past experience. If he dwells on such abstract ideas as "being," or "contradiction," or even tries to think of "nonentity," he will perceive, if he looks closely into his own mind, that the presence of those ideas is accompanied in the first case by transient images of bodies he has perceived, in the second case by images of bodies placed opposite each other, or in some way in conflict, and in the third case by a shorter or longer series of things thought of as existing, and then successively, as it were, ejected from thought; for to think, and yet think of nothing, is an impossibility.

Idealists are also right in saying that if we analyze our perception, or idea, of any object, whatever it may be, we shall find that we cannot imagine its constituent elements in any other terms than those of our own sensations, and they are also right in affirming that it is no less impossible to imagine anything existing unperceived. Besides all this, their reasoning against even the possibility of anything existing unperceived is perfectly logical and valid. For things which are exclusively made up of "feelings"—as they affirm all objects perceived by us to be—can have no existence except as felt. Obviously "feelings" could have no place in a universe which was entirely devoid of feeling. In maintaining the truth of the foregoing propositions, idealists, then, have reason on their side. There is, however, another most important fact of which they fail altogether to take note, namely, that over and above acts of sensation and imagination, the action of the intellect has

Complementary truth.

to be taken into account. It is quite true that we can neither feel nor imagine anything except in terms of sensation, and that we can neither perceive nor think of anything save through the aid of our feelings; but it is no less true that we can, with their help, both perceive and conceive of things that never were and never can be either felt or imagined. It is true that everything we perceive is constituted by groups of our feelings, vivid and faint, but it is no less true that what we perceive in perceiving anything, is not merely a group of feelings vivid and faint, but something altogether beyond feeling. In this respect our perception of bodies around us is quite like, and runs parallel to, our perception of our own being.

In the second chapter it was pointed out that what we immediately and directly perceive,* with respect to our own being, is our concrete activity—ourselves acting or enduring—and not either our states of consciousness or the continuous existence of the self which has those states. Nevertheless we recognized the obvious fact that we can at will turn back our minds and advert either to the existence of "our states of consciousness," or to that of "our self," as a persisting objective being. We also found† that it was the unnoticed presence of those "states of consciousness" which brought about our direct perception of our own concrete activity, and were the necessary conditions for the very existence in us of that perception. Just in the same way our perception of any object—say a tree—is an immediate and direct perception of the concrete tree itself, and not of the sensations which it occasions in us or of the persistent existence of the tree which gives rise to the sensations. Just in the same way, again, we can, if we please, turn back our minds and advert either to the existence of the sensations we have felt in perceiving the tree, or to that of the tree itself as a persisting objective thing. Similarly it is the unnoticed presence of "our sensations" which has brought about our direct perception of the tree, and such "sensations" are the necessary conditions for the existence in us of that perception. If the reader will consider for himself the action of his

* See above, p. 20. † See above, pp. 21, 22.

own mind, he will, we are persuaded, see the truth of what we now urge. Should he, for example, when reading this, have lately met a carriage with some friends of his in it, let him ask himself what was present to his mind at the time? We are sure he will say it was the presence of the carriage and his friends which he directly perceived. No doubt, in order to perceive them, he must have experienced certain sensations, and no doubt his eyes saw various patches of different colours, different in size and shape, and his ears heard sounds produced by wheels and horses' hoofs and by the vocal organs of his friends. But he never adverted to these sensations at the time he felt them, though he can turn his mind back and recognize that they were then present to his sensitive faculty as they now may be to his imagination. His intellect was not occupied about his sensations when he perceived his friends, so that his sensations, though affecting his sensitive faculty, were not themselves perceived. Such sensations, or subjective signs, make bodies known to us without being directly known to us themselves. They are the means which enable us to perceive objects, but they are not themselves the object of perception. They hide themselves from our notice in giving rise to the perception they elicit, and can only be detected by an express turning of the intellect upon them. With practice and attention we can turn back the mind and observe these subjective signs; but ordinarily, though felt, they remain unnoticed, and we only perceive the thing they reveal. The subjective signs are only to be apprehended with more or less labour and trouble, and never spontaneously or naturally occupy our attention. It is the thing they signify which is naturally, easily, and clearly apprehended by all men. In seeing and touching things which we come to know through seeing and touching, we have of course such "subjective signs"—visual and tactual feelings, vivid and faint—but these latter remain in themselves unnoticed by the mind which is occupied in perceiving the objects so signified and made known. We can with practice draw out the perspective lines of a building we look at, but in looking at it we do not naturally perceive them, but it. When a solid cube is placed before us, we perceive that the

Sensations the means, not the object, of perception.

cube has square faces, although, from its position, the surfaces it presents to our eyes may not appear to be squares but lozenges. Our perception of an object remains quite unchanged, for all that the subjective signs it occasions may undergo a number of changes through its movements or through our change of position.

If we walk through a colonnade, the aspects of its columns continually change in our sight, but the colonnade remains one unchanging reality to our apprehension. Thus in every perception we have two elements: (1) a subjective element made up of the various signs it gives rise to in our sensitive faculty, and (2) an objective element which is the object itself made known to the intellect by those signs. It is the second or objective element which is directly, naturally, and clearly apprehended, and it is the former which is to be distinctly detected only by an effort of reflex mental activity. Idealists, indeed, tell us that "all we can receive through the presence of external objects must consist of impressions, images, or representations of such objects, which can be no more like the objects themselves than a picture is like the thing it represents." Ordinary men, however, think that what they perceive about them is not a collection of "impressions," "images," or "representations" of different bodies, but the very bodies themselves. We are convinced that in so thinking ordinary men are right, and that the contrary belief constitutes the fundamental error of idealists of all schools. This fundamental error we believe results partly from the ambiguity of the word "representation," partly from our knowing that an image of our external surroundings is formed within our eyes. But an examination of our own mind shows us that our faculties not only furnish us with images or impressions of things, but by means of those images and impressions they *represent* a thing—that is, they *make the thing present* to the intellect. If we enter a library, we do not then see images of books in rows—we see the very books themselves. They are things made directly present to our mind by its faculties. We do not perceive any image or impression of them, though a variety of agents may concur in eliciting our perception, and the number of these agents

Two elements in perception.

True meaning of "represent."

differs in different perceptions. Thus in listening to the stroke of a bell we may distinguish no less than seven objects, powers, and actions: There is (1) the person who perceives the bell's stroke; (2) his sensitive power or faculty as active, or actually hearing; (3) his sensitive power or faculty as passive, or as about to be affected by the action of the bell; (4) his organ of hearing, by means of which his sensitive faculty is affected; (5) the medium by which the influence of the bell is transmitted to his organ of hearing; (6) the bell itself which sounds; and (7) the power or quality of the bell which causes the transmission of the influence. But of all this it is only the striking bell which the intellect directly apprehends.

Men have ordinarily little knowledge of such complex distinctions and diversities of objects and operations. They perceive things without knowing how they perceive them, as they make articulate sounds without knowing how they move their tongues and lips in order to utter them, and they may end their days in perfect ignorance of such things without being any the less able either to articulate or to perceive. That people see things themselves, and not "images" or "representations" of them, is a conviction so universally entertained as to make idealists affirm that men are in this respect universally mistaken and think they really perceive what, in fact, they only infer by an unconscious or forgotten process of inference. But the word "inference" means, as we have seen,* the perception by our mind of the fact that one truth is implicitly contained in other truths antecedently known. An unconscious inference must, then, be a contradiction in terms, for we cannot bring a latent or implicit truth explicitly before the mind without having it present to the mind, nor can we recognize that what is now explicitly known to us was implied in what we knew before, without being aware of what we are about—that is, without being conscious. An inference, however, which takes place consciously may excite very little attention in our mind; may be unnoticed, or at least rapidly forgotten. Can it, then, be contended that our perceptions are due to such

Perception not inference.

* See above, pp. 55–57.

hasty, little adverted to, unnoticed, and speedily forgotten inferences? Now, if inferences have been really drawn, then, though they may have been unnoticed at the time or forgotten, they can always be perceived or recalled by reflection. Thus, if we have mistakenly thought we saw a friend in the gloaming, in a place where, and at a time when we knew it was likely we should see him, we can easily recognize that our mistake was due to our having concluded it was he on account of such probabilities, of which we were thus aware. We can recognize that our mind had been in that state of consciousness which is expressed by "seeing a consequence"—seeing the force of a "therefore"—when we reflect and examine what the state of our mind was. The presence of a conscious inference, unnoticed at the time of its recurrence or rapidly forgotten, can be thus recognized after the event. But it is impossible to recognize the presence of any act of inference *in* our ordinary perceptions of objects about us. When, for example, we have perceived an orange, and look back and examine that perception, we do not find that we have mentally said to ourselves, "I see a certain roundish patch of orange colour; I feel a certain shape, firmness, and size, and I smell a certain smell; therefore I perceive an orange." Just so is it with the immense majority of our perceptions. Why, then, should we deem these to be "unconscious inferences" when our own minds declare they are nothing of the kind? Can it be supposed to be more wonderful or mysterious that we should perceive "objects," than that we should perceive "inferences"? An "inference"—a perception that one thing must be true because its truth is implicitly contained in other truths—is surely a much more complex and involved mental process than is the direct perception of an object. For this reason, then, if even for no other, we should not conclude that we have made use of a process of "inference" when nothing in our own minds tells us that we have really done so.

To explain this matter it will be necessary for us to here introduce some statements about our faculties which will be dwelt upon and justified in the next section of this

book. Thus we affirm that we have three orders* of faculties: one intellectual—by which we apprehend such ideas as "goodness," "truth," etc.; another sensuous—by which we entertain feelings and associate them together in groups; and, thirdly, an unconscious vital power—by which life is mainly sustained, and by which vital processes take place on the receipt of unfelt impressions, and may, by their accumulation or prolongation, come to excite our "feelings." Indeed, the area of our consciousness is a very restricted area compared with the area of our organic vitality, by which expression we mean the total sum of the unfelt active processes and powers of our living body. Every conscious act in us is the result of a greater or less number of such unconscious vital processes, and if this is the case, then the act of perception must be the result of a number of such unconscious processes. We not only admit this, but we affirm it. But so to affirm is a very different thing from saying that a perception is an unconscious inference. That process in us which has been mistaken for "unconscious inference," in reality consists of such unconscious vital processes, together with the association of images in the imagination. We may know this from the fact that a mere animal can so associate together the sight of changes of relative position between itself and another creature as practically to apprehend either that its prey is escaping or that an enemy is approaching, as the case may be. Such merely sensuous associations of images exist in us as well as in the lower animals, and underlie our intellectual perceptions and inferences. Reflection enables us to apprehend these various, at first unnoticed, mental elements, and thus to distinguish between (1) an association of images, (2) a perception, and (3) an inference. Thus signs of relative changes of place impressed on our senses by objects, awaken in our intellect the idea and perception of a moving body, though they may not enable us to determine where the motion is, without a further examination or even without a real process of inference. We have a notable instance of the employment of such a process, in the belief once enter-

What so-called "unconscious inference" is.

* See below, chap. xiv.

tained about the motion of the sun. That belief makes us aware of a process of inference which was and is often overlooked, but which can be clearly seen on reflection to have been an inference, as it is not "motion," but "change in relative position," which our senses can alone perceive.*

But it is the less necessary to accept the contradictory notion that a "perception" is an "unconscious inference," because we may and we do obtain a reflective assurance of the truth of our perceptions without employing inference. No one can deny but that a distinction is to be drawn between "attention" and "inference," and we may gain an increased or absolute certainty for our perceptions by acts of "attention," quite without the employment of "inference." The reader will, we think, admit that he can perceive an object—say a horse or a tree—consciously, but without any particular attention, and that he is also capable of looking at it attentively and making sure that it is a horse or a tree, yet without using any process of inference. He can thus "make sure" by merely tightening, as it were, his sensuous grasp of the object, and carefully focussing his sense perceptions.

Perception certified by attention.

Let the reader here call to mind how he has sometimes, if not often, thus made sure of some object by looking at it attentively in a sudden and spontaneous manner, and quite without any deliberate attention—without saying to himself mentally, "I will look carefully and make sure." This action, so common amongst men, is also common amongst animals, which can evidently so associate images as to seem to us, at first sight, to draw inferences—though all such actions on their part are explicable (as are many of our own) by the mental association of habitual co-existences and sequences of sense impressions. They also may perceive an object indistinctly and inattentively, or they may tighten their sensuous grasp of it and watch it. We likewise have such merely sensuous perceptions, and such sensuous associations simulating inference. But over and above these, we have intellectual perceptions and true inferences. Our intellect, then, can, as before said, perceive

* See below, chap. x.

objects either directly and inattentively, or directly and attentively, and no doubt our attentive perception is aided by sensuous association. But since we have consciousness to go by, it would be absurd to call any action inferential, which is neither consciously perceived to be inferential when performed, nor seen, on subsequent reflection, to have really had that character. In perception, then, we both can and do gain an immediate assurance, and also (*i.e.* by attention) gain an augmented assurance, that the truth of any given perception needs no further proof, but is quite certain, and this without using any process of inference. Thus perception is not a process of inference from known signs to a before unknown notion of an object, but is a spontaneous, unconscious interpretation of signs (which themselves are not distinctly adverted to), by a natural activity and power of the mind—a power the action of which is rapidly perfected by exercise.

A recognition of the fact that we have a direct and immediate knowledge of objects which are made present to the mind through our sensations, constitutes the key of the position of that realistic system of belief which is common to all men except the minute minority of idealistic philosophers. The assertions of realism are assertions both made to us spontaneously by our own minds, and also re-affirmed by our minds when we carefully reflect on the subject. They are assertions which justify the natural beliefs of ordinary men, and are the indispensable supports of the assumptions upon which the whole fabric of physical science reposes. For these reasons realism has a strong claim on our acceptance, provided that the opposite system cannot bring forward any unanswerable objections to it.

It remains, then, for us to consider one after another in the next chapter, the objections which idealists have brought forward against those natural convictions of mankind, the validity of which we confidently affirm.

CHAPTER X.

OBJECTIONS.

An analysis of certain of our ideas refutes the fundamental idealist objection. All the other objections of idealists are insufficient to show that we cannot truly apprehend even the secondary qualities of bodies, although how such knowledge, or how any knowledge is possible, is an inscrutable mystery.

The fundamental objection—Primary and secondary qualities—The common belief—Perceptions, ideas, and sensations—The idea of force—Simple and compound feelings—Imagination and conception—The intellect as a factor—Its declarations about qualities—Objections as to colours and sounds—Effects of bodily injuries on our perceptions—So-called deceptions of the senses—Dreaming and waking—The possible deceitfulness of our faculties—Our perceptions even of secondary qualities cannot be proved mendacious—The process of perceiving the unimaginable, inscrutable.

The fundamental objection.

THE objections brought by idealists against the common belief in the existence of a world independently of the mind, all rest on one fundamental assertion which may be expressed as follows: "All knowledge consists of 'impressions' (or sensations) and of faint reproductions of the same, called 'ideas.'" Ideas are thus represented as being nothing but "faint revivals of sensations and of feelings of relation between sensations." Thus, do what we may, we can—according to idealists—arrive at nothing but our own subjective affections, together with, at the most, the inference that there exists some unknown external cause which gives rise to our feelings and ideas.

Now, this fundamental assertion we have encountered point blank in the preceding chapter. We have done our

best to show that the things which men know directly and immediately, are not so many "bundles of feelings," but external objects themselves, made directly present to the mind through the feelings they excite. If we have succeeded in this endeavour, then, the one support upon which all the objections raised by idealists rest having been shown to be untenable, we might, perhaps, spare ourselves and our readers any detailed consideration of the objections themselves. Nevertheless, we think it better to distinctly, if briefly, review them, in order to remove, as completely as we can, misunderstandings which might otherwise impede us in our treatment of those questions concerning man and the world he inhabits, which will occupy us in succeeding sections of this book.

Primary and secondary qualities.

Now, idealists, in support of their fundamental assertions, appeal to what they deem the evident impossibility of our having any real knowledge of what are called the "secondary qualities" of bodies—that is, their colours, sounds, odours, and tastes—other than our own feelings respecting them. In so far as people think otherwise, they are declared to be demonstrably in error. But if they manifestly err in this matter, and if secondary qualities have no existence except in the feelings of those who feel them, then, say they, we need not be surprised if the "primary qualities" of bodies—that is, their extension, solidity, shape, number, motion, force, etc.—turn out to be in the same case, and are (as they say they are) also reducible to groups of feelings variously combined. And idealists are right in this, for if we could not directly know things themselves, but only the impressions made upon us by them, then it would also be true that what we call "primary qualities" might be reduced to groups of feelings, and that our ideas of extension, solidity, motion, etc., might really be nothing more than certain groups of those muscular feelings and feelings of effort and resistance, which have been made use of by us in acquiring such ideas. In spite, however, of this likeness between these two sets of qualities as regards the validity of our beliefs concerning them, men feel very differently in their regard. In the first place, the colours which objects exhibit can only be

appreciated by the eye, and the sounds they give rise to can only be known through our sense of hearing. But in examining the solidity, extension, figure, number, and motion of the objects we perceive, we can bring more than one sense into play, and we can test by our hands the correctness of what we think the eye indicates, and confirm the evidence of touch by vision. We have, therefore, a naturally stronger persuasion of the objective reality of the primary qualities of bodies than we have of the accuracy of our knowledge with respect to their secondary qualities. We can also much better dispense with our belief in the reality of the latter than of the former. If we were obliged to consider that the colours, sounds, odours, and tastes of the objects around us were merely subjective feelings, and that nothing in the remotest degree like them existed in the objects themselves, the world would indeed seem to be despoiled of very much of its charm, but would nevertheless still remain for us substantially what we before deemed it to be. Flowers would have lost their tints as well as their fragrance, and the melody of birds, no less than brilliance of plumage, would have disappeared. But such a transformation would be trifling indeed compared with the effects which would follow from the disappearance of the primary qualities. With their disappearance the solid earth would vanish from beneath our feet, the heavens from above us, and we should even lose the apparent fellowship of that most constant of all our companions—our own body. It is not wonderful, then, that men cling tenaciously to their belief in the reality of primary qualities. And yet if our senses of sight, feeling, hearing, smell, and taste may each and all severally deceive us, it is difficult to see on what grounds we are to repose confidence in the seeming declarations of any two of them! Yet we are told that if we think our perceptions as to the colours, sounds, odours, and tastes of bodies, are really like anything in them apart from our feelings, then we are and must be grossly in error. The colour of any object, it is said, is nothing but the result of the undulation of certain waves of light reflected from its surface on our eyes—waves of different lengths occasioning different im-

pressions of colour—and we are asked how there can possibly be any real resemblance between that condition of a body which causes it to reflect these waves, and the sensations of light and colour which we feel? Again, they say, sounds emitted by any object are merely the effects of certain minute vibrations of its substance; how then can there be any possible resemblance between such minute oscillations of matter and a feeling of sound? As well might we consider a wound, or the pain of it, to be like the knife which caused both!

Now, it is most true that a feeling in us cannot, in itself, be like a quality of an external body. The sensation "orange colour" cannot, of course, be in a real orange, nor can that "ringing sound" which we experience when a bell is struck be really in the bell; but the plain man or the rustic is not so absurd as to suppose the contrary. He knows well enough that his sensations of taste, sound, and colour, are feelings which he has, and that those feelings exist in himself, and not in external things. But he also knows that there is in these external things something which corresponds with his feelings and gives rise to them. If we question him intelligently, we shall find that he considers he does get some sort of knowledge of the real qualities of external things by the use of his senses, and that he is indisposed to believe he could get a better knowledge of those qualities in any other way. His feelings, he is sure, are his own exclusively; but he thinks, nevertheless, that he does know, by means of his feelings, something of the objective qualities of things as they really exist in themselves, independently of his perception of them. And herein the "plain man" is right. His belief is the spontaneous and universal belief of mankind, apart from idealist philosophers, and a spontaneous and almost universal belief of mankind should be accepted and acquiesced in, unless there are good reasons against so doing. That such "good reasons" do not exist it is the object of this section to show. Nevertheless, we would not be understood to maintain that either rustics or philosophers are furnished with the means of knowing *exhaustively*, either all the qualities of objects, or what those objects and qualities are in themselves. It may

The common belief.

well be that, had we other senses or differently formed organs of sense, we might be able to apprehend qualities which we now cannot even imagine, or have a far more complete knowledge of some of those we know already. Our knowledge of the objects around us may be very imperfect compared with the knowledge of them which more exalted intelligences might be able to attain to, and there may be many objects in existence which we have no means of perceiving. For all that, it is quite possible that our knowledge of secondary qualities may at least be true to such an extent, that the man who affirms these qualities to exist objectively, as we apprehend them, is indefinitely nearer the truth than he who simply denies their objective existence.

But here we must direct the reader's attention to a very important distinction. We have seen * that in our perception of any object, that object is made present to the mind by sensations which are hardly, or not at all, adverted to by us. The presence of the object in the mind is a presence in the mind's perception, not in its sensations. When men affirm that secondary qualities, as we know them, cannot possibly exist objectively, what they really mean is the truth that "a feeling" cannot exist except as felt—and this, of course, is true. When they further say that a "secondary quality, as we know it, cannot be like an objective quality of an external independent body," they mean "a feeling cannot be like an objective quality"—and this, of course, is also true. They forget, however, that there may be a correspondence between our "perception" of an object and that object, although there can be no such correspondence between that object and the "sensations" which give rise to our perception of it. For, as before said,† we have a power both of perceiving and conceiving things which "never were and never can be either felt or imagined," and we saw almost at the outset of our inquiry ‡ that a recognition of the trustworthiness of memory is enough to show us that our intellect can know objective existences which are absolutely imperceptible to the senses. We will do our best to

Perceptions, ideas, and sensations.

* See above, p. 91.

† See above, p. 89. ‡ See above, p. 36.

enable the reader to further test for himself the truth of these assertions; and if he should decide that there is indeed the great distinction between "feelings" and "ideas" which we say there is, and if he should also be convinced that he can truly perceive some of the objective qualities of bodies, then he will no longer find it so strange that his power of perception should enable him to apprehend the secondary qualities of bodies also.

Before entering on this question, however, it may be well to advert to the distinction drawn by idealists between: (1) sensations and perceptions, as being vivid feelings, and (2) ideas, as being faint revivals of vivid feelings formerly experienced. There is plainly a great distinction between perceptions and ideas, but it by no means consists in the greater vividness of the former, but in their permanence and their independence of the will of him who perceives. As to mere vividness, ideas and emotions may be more vivid than many sensations. Ideas will sometimes return again and again with a keenness only too well known to those who have experienced misfortune, and pleasurable ideas and anticipations will occasionally produce an excitement almost beyond control. But, apart from such extreme affections, how many of us when listening to some melody familiar in early days, or when seeing again, after a lapse of years, some spot dear to memory, have not felt the force of ideas thereby recalled far more vividly than the actual sensations of ear or eye which have served to recall them!

On the other hand, perceptions and ideas can be well distinguished, by the relations they respectively bear to our volition. Every one knows that he has no power to change his perceptions of objects, though his ideas of objects can be influenced by his will. While gazing at the National Gallery, we cannot, try as we may, change our perception of that building into a perception of the sea at Brighton, or of the Jungfrau viewed from Interlaken. We cannot by any merely mental effort banish either the objects visible to our eyes, or the hum and rattle of the busy streets. But if we are only *thinking* of the National Gallery, then we can, at pleasure, divert our imagination from that vision,

and call up a mental image of the sea at Brighton, or of the Jungfrau bathed in sunshine. We can, therefore, clearly distinguish, quite apart from their greater or less vividness, two very different sets of mental phenomena. In the one set there is great facility of change, in the other there is permanence. In imagination our will has great power, while in perception it is impotent.

But to return to the question whether any of our ideas contain what was never felt, and are therefore more than mere collections of faint, agglutinated, and modified sensations: It is sometimes represented that our ideas may be analogous to those photographic portraits in which the superposition of various different images results in the formation of a generalized picture, somewhat like each image, but absolutely like no one of them. Thus, it is said, our idea of a horse is a similar spurious unity—a sort of amalgam of the images of all the horses we have ever seen. But if the reader will think what he really means when he says, "That is a horse," or "a pair of horses," he will see that there is far more in his "perception" than was ever contained in the sensations which gave rise to it. The sensations most probably do unite to form a generalized mental image, but not "an idea," which is something very different, as will shortly more plainly appear.* When we say, "Those are two horses," our full meaning is, "those two objects which really exist independently of our perceiving them, are two solid, material, living creatures of an animal nature, belonging to that group of beings which we distinguish from other animals by the name 'horse.'" Even then, in so simple a perception as that here selected as an example, the mind has within it a number of latent conceptions such as those just drawn out, and besides these it has a number of other yet more abstract ideas. For in every such perception there are, and must be, latent the ideas † of "existence," "distinction," "similarity," "unity," and "truth." But the reader must not be surprised if he does not immediately recognize the presence of these ideas. Their presence is not explicitly recognized with ease,

* See below, chap. xiv., "Sensuous Generalized Cognitions."

† See further chap. xvii., "Ideas of Existence, Essence," etc.

except by the aid of reflection. Nevertheless, he will be able to detect their latent presence, by considering the results which follow from the denial of any one of them. Thus, if some one were to say, "What you call horses, only exist in your imagination," our assertion, "I see two horses," would be contradicted by the denial of the real existence of the animals, and thus we see the idea of their real existence was implicitly contained in our assertion. If another person were to say, "You see double; there is really only one horse," our assertion would be then equally contradicted by this denial of that "distinction" between the two objects which we thus find was implicitly present in it. If yet another person remarked, "They are not two horses, for one is a mule," such a remark would contradict our assertion by denying that "similarity" between the two objects which is thus further shown to have been also implicitly asserted. The latent idea of "unity"* would also thus be made manifest, for they would not then be a true "pair"—not two creatures of one nature; for that unity of their nature, which we thus see was implied in our assertion, "I see two horses," would thereby be denied. Lastly, if one more opponent simply said to us, "What you say is not true," our assertion thereby would be most plainly contradicted, and thus we see that the idea of "truth" formed an integral part of our affirmation. The idea of "truth," indeed, is latent in every affirmation. The essential part of a judgment is the direct (not, of course, reflex) perception of its truth. Leave that out, and it remains a mere play of thought,† in which no judgment is passed. But most certainly "truth" was never felt by any one, and the presence of that idea in any mental process shows, as does the presence of the ideas "existence," "distinction," and "similarity," that such mental process contains more than could exist in any collection of vivid and faint sensations.

Again, let us suppose that other ideas—such as those of "materiality," "life," and "animal nature of a certain kind"—latent in the notion and affirmation, "That is a horse," be denied. Thus, let us suppose it to be said, "That horse

* As to the idea of number, see below, chap. xvii.

† As pointed out by John Stuart Mill. See also below, chap. xvii.

which you think you see is not a material thing, but a mere spectral illusion produced by cleverly arranged looking-glasses," or, "It is not alive, but only a stuffed skin," or that the objection be again made, "It is not a horse, but a mule;" then by each of these denials one element of the original assertion will be seen to be contradicted, and in each case the denial brings out clearly and makes distinctly known to us, the latent presence of an idea which exceeds and differs from any and all our past sensations. The multitudinous sensuous impressions we have had of different horses of various sizes and colours, have, of course, had their effect upon our imagination, and reminiscences of these concur with freshly received impressions to aid us in eliciting the perception and idea of a horse by a direct natural process, as before pointed out.* But that the idea of a "horse" is not a mere amalgam of modified imaginations, or a mere generalized mental image, is plain from the fact that the imaginations which have helped to call it forth, may persist in the mind side by side with it, which they evidently could never do if the idea was made up of such imaginations. Neither can our idea of a horse be an imagination generated by antecedent impressions and imaginations, for the notions implicitly contained within it, show it to be something of an altogether different kind. These notions—"existence," "similarity," "distinction," "unity," "truth," "materiality," "life," and "animal existence of a certain kind," are things beyond the domain of the senses, and cannot be contained in any mere images or sense-impressions. To make such an affirmation, then, as "That is a horse," is to emit a judgment as to the essential nature of the thing perceived—or rather, to make a whole series of implicit judgments. If our mind, in every distinct perception of the kind, has such conceptions really latent within it, then our idea of any such object must be a collection of latent judgments, with the perception that they all relate to one thing, *i.e.* it must be a perception of "unity." Thus every perception contains implicitly a judgment, or rather, a group of judgments.

Let the reader examine what his own mind tells him

* See above, pp. 90, 91.

and we are persuaded that he will see that in perceiving any body to be "solid," "extended," and "one body," he has in each case a clear and simple idea, and not an amalgam of feelings of "effort," "motion," "pressure," "touch," and "sight," however indispensable such feelings may have been in order to call forth perceptions and ideas of solidity, extension, and unity. Moreover, the idea of extension may exist apart from sensations of sight, for it exists for the blind. It can exist apart from sensations of touch or of muscular effort, for it may be revealed by sight alone. The idea can exist unchanged in our minds while the extended object we happen to be observing changes from solid to fluid, from hot to cold, from smooth to rough, from a state of rest to that of motion, and so on. The idea is a single idea, although it is aroused within us by a multitude of sensuous experiences of different kinds.* That such feelings are needed to give birth to our idea of "extension," does not show that such feelings *are* the idea of extension. As well might we say that "gold" is "digging," because acts of "digging" may have been needed to enable us to acquire it. The nature of an idea is one thing; its mode of elicitation or acquisition is another and a very different thing. Thus also our idea of "force" becomes known to us by means of our sense of effort, of resistance, and of resistance overcome, and sensations of the kind are the occasions through and by which our intellect comes to perceive that surrounding bodies have powers corresponding to our own. Some persons pretend that we thus commit the absurd mistake of attributing to inanimate bodies around us, activities absolutely like our own. But, in fact, we only attribute to such bodies activities which have a certain analogy with our own. If we try to pull a man up from the ground, and fail because he is stronger than we, and if we try to raise a heavy trunk, and fail because it is too heavy, we can indeed perceive a certain analogy between the pulling action of the resisting man and the pulling of gravity in the heavy trunk. But we also see that there is a great difference between the two cases, not merely in the concomitant circumstances only, but also in the essen-

The idea "force."

* See also below, chap. xv., "Elements of Perception and Abstraction."

tial natures of the two "pulls." Although in either case we have more or less similar sensations, yet our intellect arrives at a quite different result, perceiving in the one case an active, living power, and in the other case a physical force. It is similar with respect to the ideas "extension," "figure," "number," etc. By means of our sensations and the relations between them, we arrive at something fundamentally different from either—namely, an apprehension of external, objective conditions of real independent bodies, which conditions are utterly unlike the sensations and relations between sensations that serve to make those objective conditions known to us. By a comparison of our perceptions of "extension," "solidity," "force," "number," etc., with the sensations and relations between sensations which occasion them, we see that the latter are by no means equivalent to the former, and that in a mere collection of such feelings we miss the main point, the very essence, of each such perception which is essentially one thing—a unity. The reader will, we think, feel the force of this if he merely reflects how, in his perception of either the shape, or the firmness, or the power of a cricket ball, he apprehends one thing, and not a collection or assemblage of "feelings."

Simple and compound feelings.

But here it may be further objected that our belief in the unity of such ideas is a mistake, and that though they seem to us simple, they may yet be really compound. In proof of the possibility of such a deception, our feeling of musical sound has been brought forward as an instance of a mistake of the kind. It is true that we may first hear a succession of distinct taps or beats, and that these may get quicker and quicker, till they can no longer be identified as separate "states of consciousness," while there arises, instead of them, the sound of a musical tone. It is also true that, as the beats get quicker and quicker, the tone will go on rising in pitch till it again becomes inaudible, while, if certain other beats take place simultaneously, we then get that quality of sound called "*timbre*." These facts may also be made more striking by holding a vibrating musical fork between the teeth, for thus we are enabled to feel through the teeth the jarring sensation of the beats,

while at the same time we hear the musical tone. On account of these facts it has been asserted that our sense of hearing deceives us into the belief that our feelings of "musical tone" and of "timbre" are simple feelings, while all the time they are really compound, and made up of transformed feelings of vibration. Hence it has been further argued that as our senses may thus deceive us in leading us to believe a sensation to be simple when it is really compound, so also it may well be that an idea we think to be one, may also be really compound and made up of transformed sensations.

Now, granting in the first place, if only for argument's sake, that a feeling of "a musical tone" or of "timbre" is each really a unity and quite single, as supposed by this objection, let us see whether even thus the argument so brought forward will hold water.

A pure and simple "feeling of musical tone" and nothing else, cannot be felt to be made up of "feelings of rapid beats," though it may succeed them, for if it was felt to be thus compound, it could not at the same time—as in the argument we are considering—be felt to be simple. It must, therefore, be supposed to be made up of minute feelings of throbs which are not felt. But an unfelt feeling is impossible; it is a contradiction in terms. To say that the feelings thus felt to be different, are fundamentally the same, because of the fundamental similarity of the cause which calls them forth, is to confound the physical conditions of feelings with the feelings themselves. We might just as well say, if a certain number and velocity of taps caused us a pleasant feeling, while an increase in their rapidity caused us pain, that pleasure and pain are the same thing, or that pain is made up of a number of small unnoticed pleasures. Thus this argument against the unity and singleness of our ideas falls to the ground. But though we have considered it on the assumption that a feeling of musical tone or timbre is a perfectly simple unity of feeling, we are by no means sure that such is in fact the case. We recollect well, when listening in the Baptistery of Pisa to the reflected musical chord produced by the successive singing of four notes, that our sensation

seemed to us to be by no means a purely simple sensation. Whether, however, such a feeling is or is not a simple unity of *sensation*, we are quite certain that it is a perfect and simple unity of *perception*, and it was the unity of each of our perceptions of the extension, shape, firmness, and power of the cricket ball which we affirmed. We were far indeed from denying the multiplicity of the feelings underlying each such perception.

But to show yet more clearly that by the help of our feelings we can perceive what is altogether beyond feeling, we may consider the force and real meaning of a few expressions in frequent use. Thus we often speak of our "experience," and the idea is a familiar one to most people. Yet the idea cannot be a faint reproduction of past feelings, for "experience" was never felt—not even as a mode in which past feelings have stood to one another. By the repetition over and over again of feelings of the same or of different kinds, we may find it easier to feel them, or they may become more pleasurable to us or less so. But to undergo such changes in feeling, and to obtain the idea "experience," are two very different things. Feelings of ease, of pleasure, or of pain, may blend with the sensations the repetition of which occasions them, but the idea "experience," is the conception of something which, as it were, stands beside and contemplates past feelings, or the objects and circumstances which have given rise to them, in relation to some continuously existing being who is the subject of such experience. Let the reader ask himself whether in saying, "I have experienced something," or, "Some one else has had an experience of a definite kind," he does not mean to refer to some objective modification induced in himself or in some one else, and not merely to some change in feelings or in the relations of feelings to one another. Again, we who see, can all form an idea of our act of seeing, yet that act of seeing was never itself felt, nor was it even a relation between feelings. We may have a certain feeling in our eye-balls when looking, but even if we could feel every most minute action of every part of the eye's complex mechanism, such feelings would no more be an "act of seeing," than opening

a shutter would be the same thing as seeing a landscape which it, while unopened, hid from view. We have, of course, seen very many sights, but our act of sight itself was never one of them. Yet we all know very well what it is, and we all constantly speak familiarly about it. Amongst things seen, we continually see colours, and have different feelings accordingly. We, however, never feel or see "colour," though we know well enough what the conception or idea "colour" is, and we frequently and familiarly use it. It is often remarked that time is felt to pass more rapidly by the aged—that months to the old man appear no longer than weeks to the young man. This may be the case as regards feeling, but not as regards the intellect. The old man does not intellectually recognize months *to be* weeks.

We have another example of apprehending what was never felt, in the idea we form of what we mean by the term "nothing," or "nonentity." That evidently cannot be a faint revival of past sensations or relations between sensations, for we could never feel "nonentity," nor could it ever be a mode of feeling, since every mode of feeling or relation between feelings, must be some mode or some relation, and therefore cannot be "nothing." As we have already seen, it is impossible to imagine "nonentity," though, by the help of transient images, our intellect can conceive of it.* We show by expressions we constantly use that we can conceive of it and have a definite idea about it. How commonly we hear it said, "That is worth nothing," or, "It is empty; there is nothing left in it"! It may perhaps be said, in reply, that the idea "nothing" is no idea at all, and that to apprehend it is no conception of the mind, but simply the absence of any conception—*i.e.* that not "to conceive" is the same thing as "to not conceive." Such a reply, however, would be a very erroneous one. "To not conceive" is a mere expression of passivity, and the "absence of any conception" in the mind leaves the mind a blank. But when we say "nothing can make itself," or "nonentity cannot act," the mind is not a blank, and it is also active, for we

* See above, p. 88.

thereby make judgments. Such expressions the mind can understand. They are very different from what they would be if a mere blank took the place of the idea and word "nothing," as is easily shown experimentally: "—— can make itself," and "—— can act," are expressions without meaning, but let the word and conception "nothing" be substituted for the blanks, and their meaning becomes clear. It is also plain that we understand the idea expressed by the words "nothing" or "nonentity," since we can distinguish them clearly from all other ideas. But if our intellect has thus the power of apprehending, through sensation, things that never were, and never could be felt, why should we distrust its assurance that it tells us truly concerning at least some of the real objective qualities of bodies? That it can and does so tell us is, however, one of those self-evident truths which need no proof, and which cannot be denied without self-stultification. For if we see that any two things are alike, we must know that they have the real objective condition of "being deemed by us to be alike," since otherwise they might at the same time be deemed by us to be alike and not deemed by us to be alike, which would violate the principle of contradiction, and so land us in absolute, universal scepticism, which, as we have seen, is mere absurdity.

It thus becomes evident that we can know some real objective conditions of bodies. Nor is this, after all, exceptionally wonderful, for we have seen in the third chapter * that we know objective truth as regards our own continued existence, and if we know truth about one such existence, it becomes probable that we may know the same about other existences also. It also becomes evident that ideas and sensations are very different, apart from their vividness, as also that ideas are not collections of modified feelings, and that we can know some real objective conditions of bodies.

Imagination and conception.

We have, indeed, said more than once that "nothing can be *imagined* which has not been experienced by our sensitive faculty;" but many things may be *conceived of* which have never been thus experienced, for there is a great

* See above, p. 36.

difference between our powers of imagination and of conception. That which is unpicturable may be conceivable, and the abstraction which is impossible to the imagination may be easy to conception. That our power of conception is not tied down to experience, is shown by the fact that we can conceive of our possessing other senses than we have —senses which should inform us, for example, about the magnetic condition, crystalline construction, or chemical composition of bodies, and we can conceive of our own annihilation. But nothing can show more clearly that we can conceive of what we have never felt and can never imagine, than the fact that we can think and speak of a world neither light nor dark, but in an utterly unimaginable condition, and of bodies entirely devoid of colour. For it is certainly impossible for us to imagine a world utterly devoid of light, and yet not dark, or to imagine absolutely *uncoloured* objects, however neutral the tint or transparent the appearance which they may seem to our imagination to present. There are thus four very distinct kinds of propositions which may be proposed for our acceptance—

(1) Those which can be both imagined and seen by our intellect to be true ;

(2) Those which can be imagined, but which are seen not to be true (as that centaurs and mermaids are real living beings) ;

(3) Those which cannot be imagined, but which can be conceived of as true ;

(4) Those which cannot be imagined, and are also seen to be positively and absolutely impossible.*

The intellect as a factor.

Thus, over and above acts of sensation and imagination, the action of the intellect has not only, as before said,† ever to be taken into account, but the highest place must also be assigned to it. Though many men would assign to our sensitive faculty the dignity of acting as our supreme and ultimate test of reality and truth, we unhesitatingly affirm that it is the intellect alone which is supreme, and this not only in judging about abstract matters, but also in judging of matters of which the senses take cog-

* See above, p. 41. † See above, pp. 88, 89.

nizance. People who believe in the ordinary way about the independent existence of the external world, must rely upon their intellect exclusively, with respect to all questions which cannot be submitted to the examination of the senses. But even with respect to all matters which can be so submitted to the test of sense, the last word in all cases of doubt rests with the intellect and not with the senses. It might seem that in making experiments with different bodies (as in chemistry) to see what their actions or the result of their actions may be—it might seem, we say, in such matters wherein we directly appeal to our senses for information, that it is those senses which are our ultimate criterion, and that their declarations must be supreme. Yet such is not in fact the case. The enormous value of our sensations is not for one moment to be contested, and we have already admitted and asserted that it is by and through our sensations that all our knowledge is initiated. Observation and experiment are always, of course, to be made use of when possible for verifying our deductive reasonings; nevertheless, in the last resource, when we have done observing and experimenting, how do we know that we have obtained such results as we may have obtained through these processes, save by the intellect? How are we to judge between what may seem to be the conflicting indications of different sense impressions? Nothing could be more foolish than to undervalue the testimony of the senses, and the senses are truly a test and cause of certainty, but they are not *the* test of it. Certainty is not in sensation, though sensation is so constantly our means of acquiring it. Certainty belongs to thought, and to thought only. Self-conscious, reflective thought, then, is our ultimate and absolute criterion. It is by thought only—by the self-conscious intellect—that we know we have "feelings" at all. Without that we might indeed feel, but we could not know that we felt or knew ourselves in feeling. Our ultimate court of appeal and supreme criterion is the intellect, and not sense, and that act of intellectual perception which is thus ultimate, we may call "intellectual intuition."

Now, what does our intellect tell us about the primary

Its declarations about qualities.

and secondary qualities of bodies? Surely it tells us that just as we apprehend the former by sensations which are more or less different from the primary qualities they reveal, so sensations of colour, sound, etc., reveal to us other objective qualities of bodies which are more or less different from the sensations themselves which reveal them. Moreover, it tells us that the objects may have similar objective secondary qualities, though the sensations revealing them are different, or may have different objective secondary qualities while the sensations which reveal them are similar. For colours are distinguishable by us as belonging to two different categories, which may be called *intrinsic* and *extrinsic* respectively. By intrinsic colours we mean those which are permanently present in the bodies which show them, which are steady and do not vary when looked at from different points of view, and are not due to the colour of any transparent medium through which they are seen, or the reflection of any hue upon them. Such intrinsic colours are exhibited by most natural objects when viewed near at hand. As examples of extrinsic colours, may be taken those due to a coloured medium through which any object may be viewed, or colours reflected upon objects or colours devoid of permanence which come and go with the motion of an object, or according to the direction in which it may be viewed. Now, the stable colours of objects, intrinsic colours, are indeed naturally taken by ordinary persons to be the real colours of the objects themselves. But when they see any object which presents a mere play of iridescent colour and changing opalescent tints varying with every movement, a moment's thought suffices to show them that they have therein something different from ordinary colour—something depending not only on the object's colour, but also on other different conditions. A similar distinction may be drawn between two categories of sounds, which may also be named respectively, *intrinsic* and *extrinsic* sounds. By intrinsic sounds we mean sounds, however initiated, which are given forth by one body from its own substance for a more or less appreciably prolonged duration. Such are musical notes, the ringing sound of a bell, or the reverberat-

ing sonorousness of a gong. As examples of extrinsic sounds may be cited the sounds made by one body striking upon another, as by the wheels of a cart rumbling along a road, the ticking of a clock, or by reflected (that is, echoed) sounds, through which a mere rock may seem to articulate words or even sentences. Thus, in the illustration before given * of the various elements required to co-operate in the production of such a sound as the striking of a clock, it is the ringing of the bell which is the intrinsic sound ; and this is also necessarily accompanied by an extrinsic sound—namely, the sound of the contact of the hammer and the bell, apart from the ringing thereby induced. Though ordinarily unnoticed, because drowned in the sound of the ringing, this extrinsic sound must be present, since the blow of the hammer on the bell must produce some sound.

Our intellect, then, seems to tell us that, through our sensations, we perceive secondary as well as primary qualities of different kinds and orders, which are different from the sensations themselves but yet give us a practically serviceable and not mendacious knowledge of such qualities. And the correctness of this belief is, as we shall see, at least so far incontestable that the common belief must be nearer the truth than the negation of it can possibly be. Yet we are sometimes told that in the absence of organs of sense, silence and darkness would envelope the world. Now, our idea of "light" may probably be quite inadequate to make the essence of light known to us as we may conceive of its being known by some nature much higher than ours. But, nevertheless, our idea of "light" is, at any rate, more like objective light than is our idea of darkness. It is a great mistake, then, to think that in the absence of sense-organs the world would have neither light nor sound, and that continual darkness would envelop such perfectly silent motions as might still exist. For to speak of such an unseen world as dark, is to express objective existence in merely subjective terms after all. Such a world would be neither light nor dark, but in a condition absolutely unimaginable by us, and one which we may far more reasonably think

* See above, p. 92.

of as possessing light, than as plunged in darkness. For since we suppose the sun, moon, and stars, meteors, volcanoes, and phosphorescent organisms to exist in it as now they do, all the objective conditions of light, save sense-organs, would, by the hypothesis, be present, while the objective conditions of what, to our senses, is darkness, would not be present. Though all "sensations" would, of course, vanish from an insentient universe, yet the objective qualities those sensations make known to us would continue to exist. Other persons think that they get nearer to the absolute truth of things by considering colours and sounds to be really "modes of motion"—different orders and degrees of "vibrations." But, as we have seen, the very same cavils may be brought against the validity of our perceptions of primary qualities as against our perceptions of secondary ones, and those who dispute the truth of the latter may logically resolve our ideas of vibration, extension, and motion, into groups of muscular sensations and the relations between them. But "groups of muscular sensations" must be at least as unlike the objective causes of light, colour, and sound, as are those conceptions of light, colour, and sound which ordinarily prevail!

Armed with the foregoing considerations, let us now apply ourselves to the various objections which have been made to the validity of the ordinary apprehensions of mankind with respect to the secondary qualities of bodies, especially as concerns colours and sounds, though analogous considerations equally apply to all the other secondary qualities.

Objections as to colours and sounds.

The veracity of our apprehensions of colours is in the first place impugned on the ground that the appearance of bright coloration may be induced by merely engraving minute furrows on the surface of a body, and by other changes in the conditions of its surface structure only, or in its shape and thickness, as in the well-known case of the soap-bubble. But such iridescent and opalescent hues are forms of extrinsic colour, which, as we have seen, is by no means apprehended by us as being the same thing as intrinsic colour. Therefore our judgments are not misled

by such sense-impressions which indicate to us the existence of some real objective difference between extrinsic and intrinsic colours, even before the advance of optical science enables us to detect some of the conditions which determine the existence of the former. Such appearances no more necessarily deceive us than those produced by the reflection of coloured light on an object, or the inspection of it through stained glass or some other coloured medium. No reasonable man considers that a landscape has become really purple or orange because he happens to see it through purple or orange glass, and our faculties are not to be reckoned as mendacious because, through want of ordinary knowledge or care, an extrinsic colour may occasionally be mistaken for an intrinsic one.

An analogous objection concerning sound has been made as follows: "When vibrations become very rapid, our subjective impressions undergo a change of kind, namely, a change from feelings of successive beats to a feeling of musical tone. But, objectively, there is no corresponding change. There is objectively nothing but a series of vibrations which become more and more rapid, but which always remain, what they were at first, namely, vibrations. Therefore our feelings here intimate to us the existence of a change which nevertheless has no real existence in the things which affect our feelings."

Now, in the first place, as we before observed, it is not clear to us that our feelings of musical tone are so purely simple as this objection would represent them to be. But the question of the veracity of our faculties does not depend on the quality, multiplicity, or even on the distinct recognition of our sensations, but upon the perceptions they induce. Unfelt sensations (unheard sounds) cannot, of course, exist, but they are *not* to be considered as "unfelt," merely because the distinct limits which distinguish each may not be perceptible to us. We feel the sensations (feel the colours) of the rainbow, though we cannot see their limits, as they seem to pass imperceptibly one into another. Truth, indeed,* is not felt, nor is it in sensations at all, but in the intellect which judges by the help of sensations.

* See above, p. 104.

Now, the sensations of successive beats, and of musical tone, and of timbre, induced through different rates and groups of vibrations, do not necessarily lead to false judgments about the facts. We know that bodies may vibrate so rapidly that our ears cannot hear the intrinsic sounds they emit. Only some human ears can detect the shrill notes of the bat. It is surely probable that at the other end of the scale there may be musical notes emitted by bodies which vibrate too slowly for our ears to detect their intrinsic tones. But the sounds produced by beats and taps are extrinsic sounds. We can, however, only hear some extrinsic as well as some intrinsic sounds. Now, when we at first hear "beats" and afterwards hear a "musical tone," this change in us does not necessarily indicate an objective change. Our natural and spontaneous judgment is that at first we hear sounds—beats—produced by a vibrating body (extrinsic sounds), and that afterwards we hear sounds *in* a vibrating body (intrinsic sounds), and such is in fact the case. There is an objective duality as well as a subjective duality, although our ears can only hear small portions of either of the two series of objective sonorous qualities. Let the reader ask himself, when after hearing the vibrations of a body without a musical tone he suddenly comes to hear its musical note, but not its vibrations, whether this experience of his induces him to judge that there is any objective change in the vibrating body like the change which has suddenly taken place in his sense of hearing. We are persuaded he will reply that it does not, but only tells him that he has ceased to hear from it sounds of one order, and has begun to hear from it sounds of another order. If so, then his senses do not deceive him, are not mendacious, and the objection is fallacious.

Effects of bodily injuries on our perceptions.

But it may be further objected that the effects of some bodily injuries serve to show that the testimony of our senses is not trustworthy. Men who have had a leg amputated may still sometimes have feelings as if the leg was still on, and as if they had pains in toes no longer possessed by them. Our perceptions, therefore, it may be argued, are but the result of the conditions under which we live; and, were these fundamentally changed, then what at

present seem to us to be the most certain of truths, might appear to us to be absolute impossibilities. But no one is so foolish as to pretend that our perceptions are independent of our bodily organization, and if that organization be impaired, the action of our sensitive faculty, which depends upon our organization, will be impaired likewise. If our organization ought to be such as to guide us truly under the normal and ordinary conditions of life, it is impossible for it to be simultaneously so organized as to guide us truly under quite opposite conditions. And after all, even though a man whose leg has been amputated may suffer from pain which feels to him like a painful affection of his toes, yet he is not thereby led to perceive a leg as present which has been cut off. His eyesight and his sense of touch enable him perfectly well to control and direct his judgment rightly, in spite of the abnormal feelings which may accompany his abnormal condition. But can we expect that our organization would act normally when abnormally injured or distorted? A hydra is capable of being turned inside out without apparently much inconvenience. If we could so undergo a similar operation, no doubt the world about us would bear a singularly modified aspect; but surely that man would be an unreasonable grumbler who complained because his organization was not so arranged as to give him accurate notions of things while he was thus introverted.

In order to show that our perceptions and our convictions about the truth of things are simply due to the conditions which surround us, and therefore cannot be absolutely relied upon, the singular conception, already considered by us,* was put forward which supposed the existence of intelligent creatures inhabiting only two dimensions of space. But, as we before pointed out, men bringing forward such a supposition, and representing what the perceptions of such creatures would necessarily be, must at least think they know absolute geometric truth, for otherwise their whole argument would be baseless.

So-called "deceptions of the senses."

It may, perhaps, be objected that nevertheless deceptions of the senses are of constant occurrence; that distant

* See above, p. 47.

mountains look purple, and yet are not purple; that objects look different in size and shape as we change our place with respect to them, while all the time, in reality, they remain the same in size and shape; that under the influence of alcohol one object may appear as two objects; and that, even without this excitation, a pea held between the adjacent sides of our crossed fingers will feel not like one pea, but like two peas. But there is no real sense-deception in all this, though it is possible that there may occasionally be a mistaken inference. Distant mountains look purple, and are purple as seen by us. That is to say, such mountains, with a given thickness of atmosphere under certain conditions, have together a purple aspect. But who is so simple as to believe that the purple is in the mountains themselves, or expects to find them purple when he actually gets to them? A person might as well impugn the accuracy of his senses because when he takes up a piece of yellow glass, and looks at an object through it, his senses do not, for his convenience, remove the yellow from the glass, instead of his being left to his common sense to perceive that the yellow belongs to the medium he looks *through*, and not to the object he looks *at*. The fact that objects appear differently in different positions, we not only admit, but have called attention to in the last chapter.* Our purpose in so doing was to prove that in perception it is the object itself which is perceived, and not the sensations, or subjective signs, it occasions in us; since while the latter change, the perception of the object remains unchanged. Thus in such matters our senses in no way deceive us. The same object *looks* differently to us when seen from different points of view, but is *perceived* to be really, in itself, not different. It looks differently because, though not really different in itself, it is really different in its relation to us—that is, in its relative position with respect to ourselves. The senses would be deceitful and not veracious if they still showed us the south and west sides of a tower after we had walked round from a position opposite to its south-west angle, to a position opposite to its north-east angle. If we first stand so that the spire

* See above, p. 91.

of one church exactly hides from us that of another church, only one spire being visible, and if we then move and so come to see two spires, that does not show that we have been deceived by our senses. If we had doubted, when standing at our first point of view, as to whether two or only one spire existed, and if, without trying by change of place to test the fact, we judged at once that there was but one spire, then we should have fallen into an error of judgment richly deserved from our carelessness in making it. Similarly, changes in the apparent distance or proximity between the two spires, occasioned by change of place on our part, are perfectly veracious. Such changes do, in fact, take place through our motion, which does occasion change between the relative positions of the two spires and ourselves. The senses would be deceitful indeed if, while we walked round two objects, the sense-impressions received from them underwent no change. The objection with respect to the action of alcohol hardly deserves reply. By the action of that substance our sense-organs are apt to become functionally disordered. Now, the only action of a sense-organ is to excite feelings. That a disordered sense-organ, then, should occasion disordered feelings is only what might be expected, and is what nothing but a miracle could avert. We might as well expect to see perfectly through a telescope, some of the lenses of which had been removed, as to see accurately with eyes, the organization of which had been thus temporarily impaired. The objection drawn from the feelings occasioned by a pea held between two fingers which are crossed, may be met as follows: no one would affirm that the mere touch of a surface can occasion a knowledge as to bulk and solidity; for this there must be added thereto the sense of resistance. If, then, with the fore and middle fingers of the right hand we touch simultaneously two opposite surfaces, and find we cannot bring our fingers together, the feeling naturally arises (from long experienced associations of sensations) that an obstacle in the form of a continuous, solid body lies between them—an obstacle situated to the right of our forefinger and to the left of our middle finger. If this feeling is adverted

to by consciousness and accepted, it is a true inference. If it is a mere feeling not adverted to by consciousness, then it is a practically inferential feeling brought about by antecedent sensuous associations like those of animals noticed * in the foregoing chapter. If now we simultaneously touch an object with the same fingers crossed, the resistance experienced will be on the left of our forefinger and on the right of our middle finger, and a sensuous, practical inference thence arises that there is a solid body on the right of the middle finger and also on the left of the forefinger, and so there is. But these are positions which, under ordinary circumstances, it is impossible for any single body to hold, and so we may hastily and incorrectly infer that there are two bodies—two peas—present, and such is the practical and natural, sensuous inference which results from long antecedent associations of sensations. Therefore in such a phenomenon there is no real sense-deception. Various ingenious instruments have been invented which produce optical illusions, such, for example, as that of the stereoscope. The human intellect being able so to arrange objects as to invert the impressions ordinarily made by them on our senses, we might be sure, *à priori*, that such an inversion would also invert (so to speak) the effects produced. The results of such arrangements are all explicable on the same principle which we have made use of to explain the difficulty about the pea which may be made to feel as if it were two peas, and no such contrivances can ever show that our senses really deceive us.

"But," it may be further argued, "granting that our sense perceptions may be trusted about a small object, with respect to which we may bring more than one sense-organ into play, they cannot be trusted where we can but employ a single sense, as we learn with respect to the sun's motion, about which men were grossly deceived for centuries by their eyesight." But, in fact, they were not deceived at all by their eyesight, they drew an inference † too hastily from true perceptions, as a little reflection will, we think, make obvious. Our sight gives us no information at all

* See above, p. 94.

† As before said, p. 95.

with respect to motion itself, but only with respect to changes of relative position between objects. Thus, when we are in motion ourselves, we may be utterly unconscious of it, save for jolts, jars, the feeling of the air, and other bodily incidents which form no elements of motion, but are only accidental accompaniments of it. When travellers in a balloon ascend from the earth, they are said to have no feeling whatever of motion. It is only by looking down that they can discover any change; and then the earth's surface appears to be sinking away from beneath them. As to moving objects round us, we do not see motion in them, but only a change of position relatively to each other, or relatively to ourselves. These phenomena of the senses give rise in us to our intellectual apprehension of motion and of movement in things; but that apprehension, reflection shows us, does not take place without inference. With regard to the motion of the sun, there really is this relative change of position, a fact about which the senses give us accurate information. Our perception of this relative change of place does certainly awaken in our intellect the idea and perception of motion, but it does not, for it cannot, tell us where the motion is, without processes of examination and inference. The supposed perception of the sun's motion is an instance of an inference, not noted perhaps at the time as an inference, but clearly seen on reflection to have been an inference. It is impossible for any one to really see the sun move. If we fix our eyes on it at sunset, we shall indeed, from second to second, see that it has more and more disappeared; but we cannot see it move. As to the motion of the sun, the mass of men never think about it; those that first did think about it inferred that it moved, and their inference, imbedded in language, has so affected us, that to this day every one speaks of "the sun setting," even though they may know quite well that it does not set, and that it is the revolving earth which gradually hides it from our view. That which men's senses ever did, and do make known, is "motion between the earth and the sun" —changes in the sun's place with relation to the earth— and such changes do really take place. Therefore, in none of these instances do the senses deceive us.

Dreaming and waking.

But the certainty of knowledge may be objected to on the ground that we cannot be sure the whole of life is not a dream. It may be said, "If a man passed half his life in a sleep, in which he always dreamt a continuation of the same dream, he would not know which was his true life and which was his dream; and, therefore, we cannot be certain that our whole life is not some sort of dream." It is certainly true that we may have prolonged dreams which are very vivid and the parts of which form a continuous, consistent series of representations. It is also true that during them we may suffer distress or enjoy rapture as great as in our waking moments, and this without the slightest doubt or feeling of unreality with respect to what we seem to experience in such dreams. For all that, however, so great a difference exists between what we call "our dreaming" and "our waking states"—considered merely as subjective phenomena—that we have no difficulty in distinguishing between them when we are in that state which we call "being awake." Then we have a power of influencing the current of our thoughts, and of dwelling at will in a state of "contemplation of some object" in a way which we have not, in that state we call "being asleep." Also, while we are in what we call "our waking state," we can test our perceptions by the use, for that purpose, of different senses. If we think we see before us some object—for example, a bunch of grapes—we may confirm the apparent testimony of our eyesight by touching the grapes, or smelling them, or tasting them. We may also have recourse to a special class of feelings, which we may distinguish as "the testimony of other people." We may ask bystanders whether the object is or not a bunch of grapes, and, through their reply, our sense of hearing may come to corroborate the witness of our other senses. When we are what we call "asleep," we cannot do these things. It is true that during a disagreeable dream we may sometimes console ourselves by an assurance that it is only a dream. It is true also that occasionally we may rejoice or grieve because a dream we are having is not a dream but the very truth, when all the time we are mistaken, and it is nothing but a dream. Still, even in such a case as this, when we do wake and find

out that the dream we were so sure was real, is only a dream, we can make ourselves certain about it in a very different way from what we could when asleep. For never, when thus mistaken during sleep, do we reflect that we are making use simultaneously of different faculties to test the reality of our persuasion; whereas, while awake, we can not only thus test the reality of our persuasion, but reflect that we are so testing it. We can thus take note how much more complete our assurance about the true nature of our state is when awake, than is any assurance we can obtain while dreaming. When awake, we may think over what we have done, what we are doing, and what we shall do; we may recollect past dreams, and compare them with the objects around us, and compare the actions we seem to perform in sleep with the feelings experienced by us in what we deem our "real bodily activity." There are also other contrasts between "dreaming" and "waking." In "our dreaming state" we often have confused, inconsistent, chaotic impressions and perceptions. Appearances may come suddenly to an end, and we may have a series of imaginations which have no continuity or felt connection. We never seem to use a vigorous will; and there is generally present a sense, as it were, of passivity and of being borne along independently of our volition. The successive periods of what we call "our waking state," on the other hand, are clear, orderly, and distinctly connected, and they form a consistent series, without sudden and abrupt transitions and inconsistent changes of scene, of which we can give no account or explanation whatever, while we can employ our will and recognize our own activity. Thus, "dreaming" and "waking" can be clearly distinguished.

The possible deceitfulness of our faculties.

Let us next consider the sweeping objection that our faculties generally may be deceitful. In the very first chapter of this work we saw * that the position of the absolute sceptic is, from its unreasonableness, incapable of refutation as well as of defence. If we granted, as we have granted, that it is possible for a man to doubt about his own existence, we may well grant that it is

* See above, p. 7.

possible for him to doubt about the trustworthiness of his mental faculties generally, and therefore about the real and independent existence of the world, to which existence his faculties seem to testify. But we altogether deny that such doubts are legitimate, while fully conceding that they are possible. It is, however, as impossible for any one, without contradicting himself, to show that his mental powers are untrustworthy as to uphold any other absolutely sceptical position. For a man must implicitly and practically admit the veracity of his faculties in order to prove them to be fallacious, since he can only prove they are fallacious by the exercise of those very faculties the veracity of which he would call in question. The accuracy or deceitfulness of the testimony of the senses, as apprehended by conscious reason, can only be tested by the exercise of the senses, as apprehended by conscious reason. It is, therefore, incapable of either proof or disproof. But the fact that we are unable logically to prove their veracity does not afford us any ground for distrusting them. We have already seen that those things which are most certain are incapable of proof and need none, because they are self-evident. In this respect the declarations of consciousness as to sense are similar to the declarations of consciousness as to self-knowledge, the trustworthiness of memory, the principle of contradiction, and the validity of the reasoning process. Thus, he who upholds the trustworthiness of our sensitive faculties, as of our other faculties, is consistent throughout, and each part of the system he adheres to, gives strength to every other part of it. But the impugner of the trustworthiness of the senses cuts the ground from under himself, since, as all knowledge is initiated by sense-perceptions, he can only doubt his senses by trusting and accepting what he professes to believe to be their testimony. Nevertheless, as we have asserted in the preceding chapter, it is intellect and not sense which is the final judge and criterion of our certainty; and though the ultimate facts of sensation are as certain and indisputable as the other ultimate declarations of our faculties, yet they are often misinterpreted. Though the facts of sensation are self-evident, we may judge wrongly as to what they

point to. On the other hand, the harmony which exists amongst the several senses, is ever giving us stronger and stronger grounds for trusting them. Every one knows how constantly his sense of touch or sight confirms a testimony previously given by his sight or his hearing; nor will any one, who has not some eccentric theory to maintain, deem it probable that our senses thus harmoniously conspire to lead us into one and the same error, since truth is one, whilst error is manifold.

Our perceptions even of secondary qualities cannot be proved mendacious.

And it is certainly a vain attempt to prove that we are necessarily led into error by our senses even as regards the secondary qualities of bodies. No one has ever shown, or can, we believe, show that it is impossible for our intellect to obtain, through our sensations of colour and sound, smell and taste, the truest notions that it is possible for us to have, of the objective causes of colour, sound, odour, and savour. That objective cause must, in each case, be admitted by every one to be occult and unknown to us except as it may be made more or less known to us by the sensations it occasions. Therefore it cannot be denied that there may be such a conformity between objective qualities and the subjective feelings they give rise to, that those feelings may be the most fit means for bringing such objective, occult qualities home to our understanding. Though no doubt inadequate to tell us the whole story, such sensations may nevertheless be the best, or the only practicable, way of enabling us to know as much as we can know about such occult qualities. Thus our faculties of sensation, though they may be imperfect, are not mendacious faculties.

And, indeed, if our intellect has, as we know it has, the power of making external objects present to it, it is not wonderful that it should also have the power of making the qualities of objects present to it—*i.e.* to the intellect. Nor is it a bit more wonderful that, not the sensations, but the apprehensions they give rise to, should have a certain real likeness to the objective qualities themselves, than that our apprehensions of the objects which have the qualities should be like the objects themselves.

The process of perceiving

We may be asked, "How is such knowledge possible?"

the unimaginable, inscrutable.

"How can the intellect make present to itself either external things or their qualities?" The same answer must here be given to these questions, as was before given* to a similar question about our perception of absolute and universal truth. We know, as a fact, that we do perceive things themselves, and not mere images of them, and we know that our perception of them makes us certain that they can and do exist quite independently of our perception of them; but how it is such knowledge is possible is as insoluble a mystery as how sensation is possible, or how life or even existence itself is possible. There are many things about which we know "facts" without knowing "how they come to be facts." But our ignorance of such "modes" in no way tempts us to doubt as to the "facts" themselves. Thus, we know that bodies attract each other according to the law of gravity; we know that water, though contracting in bulk towards the freezing point, yet expands in freezing; and we know that many monkeys of the New World have prehensile tails, but that none such exist in the Old World. The certainty of men of science as to these facts, however, is not in the least impaired by their inability as yet to explain how they have come about. Neither should it be so impaired. In the pursuit of truth we should always advance from the known to the unknown, and never give up the substance of truths already ascertained, for the shadow of problems yet awaiting solution. In spite, then, of our inability to explain how it is we exist, or live, or feel, or know either objects made present to our minds by our senses or absolute universal truths, we need be none the less certain as to the fact that we do exist, live, feel, and know. Because we cannot tell how our intellect acts, is that any reason for doubting that it does act, or for doubting any of its declarations when they are self-evident? "*Ignorantia modi non tollit certitudinem facti!*" We cannot, indeed, tell how our intellect apprehends external realities by means of sense-organs, but neither can we understand how our sensitive faculty feels the sensations they occasion in and by those same sense-organs. Yet no one doubts

* See above, pp. 44, 45.

his sensations because he does not know how he is enabled to obtain them ; neither should he doubt his perceptions because he does not know how he is enabled to obtain them. Nor can he seriously doubt them, as already shown,* without involving himself in complete scepticism, which is the suicide of reason and the abandonment of the pursuit of truth. It is we, who know objects, and not our ears or our eyes or our other organs of sensation ; and those organs and our sensitive faculty cannot be shown to lead us into error (when acting normally and made use of with ordinary care and attention) by any of the idealist arguments here combated.

If we have succeeded in convincing the reader of this, and if he considers that we have successfully disposed of all the various idealist objections we have passed in review, then a not unimportant aid has been thereby given to those assertions which constitute realism, and the object aimed at in this chapter has been attained. It only remains now for us to consider certain forms of idealism which have gained more or less popularity in our own time and country, before passing on to review the leading characteristics of that external world, a conviction of the real and independent existence of which it is the object of this section to maintain.

* See above, p. 126.

CHAPTER XI.

IDEALISM OLD AND NEW.

Modern idealism is no improvement on that of Berkeley. Existence does not depend on perception, but perception on existence.

The idealism of Berkeley—The idealism of Mill—Other popular forms of idealism—Perception an accident of bodies—Objective concepts—Materialistic idealism—Monism.

WE have already admitted it to be conceivable * that a supernatural being might, if sufficiently powerful and skilful, and if there were no external world, so work upon our sensitive faculties as to produce those very same effects which external bodies actually produce upon us, and might thus give rise, on our part, to what would then be a mistaken belief in the independent existence of such bodies, and in the various properties and qualities which we suppose them to possess. This possibility cannot be denied; but any being so acting must possess not only unimaginable powers, but also a very high degree of intelligence. Evidently no unknown cause acting blindly and without understanding, could produce in us all those effects which constitute our experience, and which so largely consist of what we call "the conversation and rational conduct of our fellow-men." We cannot conceive such effects to be due to any mere force, unintelligent or blind, or in any way comparable with "gravity," "heat," or "motion." Such effects positively demand an intelligent cause as the only possible explanation of their existence. Bishop Berkeley taught that the supernatural being so acting on our sen-

The idealism of Berkeley.

* See above, p. 76.

sitive powers was God, and that the phenomena of nature were ideas thus communicated by Him to inferior intelligences. The science of Berkeley's day, however, was not as is ours, and a belief in the evolution of our world and its contents formed no part thereof. But is it possible for us now to believe that a supernatural being, of inconceivable goodness, called human intelligences into being, and then caused them all to agree in possessing the conviction that bodies exist by and in themselves, and independently of a mind perceiving them, which bodies do not exist by and in themselves, and independently of a mind perceiving them? Can we really think that a God, as ages went on, caused men to elaborate a vast, coherent, and verifiable system of physical science, with its complex invariable laws, its successful predictions and unceasing utility to human life, while all the time that system was based upon conceptions absolutely false? If, then, we were forced to think that our feelings were due to the direct action of any supernatural being, that being could not be good, but must be a dealer in falsehood. It would, however, be surely a much simpler and more reasonable course to accept as true those convictions which are common to ordinary men and to scientific experts (convictions which constitute realism), than to adopt the grotesque conception that we are always and everywhere the victims of supernatural deceits, especially as the latter hypothesis is a purely gratuitous hypothesis, and has not a leg to stand on as regards any positive evidence of its truth.

The idealism of Mill.

The idealism of Berkeley has become obsolete. No public teacher or private philosopher of repute now openly advocates his system as he understood it. Nevertheless, a modified form of idealism has obtained great popularity in England through the teachings of that distinguished logician, John Stuart Mill. He professed to believe in a universe consisting of nothing but "sensations," and what he called "permanent possibilities of sensation." Any ordinary person, of course, believes that the various objects which constitute the world around him exist independently of his feelings. He therefore believes that when he has ceased for a time to perceive any objects—*e.g.* objects in

a room he has quitted—such objects persist all the same in his absence; and when he perceives them again—as on returning to the room he had quitted—he believes they are the very same real external objects which have gone on persisting during his absence just as they were before, save as regards the accidental fact of their being perceived by him. Idealists like Berkeley, who affirm that the essence of an object is its being perceived, must of course affirm that objects, when ceasing to be perceived, cease to exist, and come newly back again into existence when they become once more perceived. Mill appears to have felt the absurdity of this opinion; and being, of course, aware, like every one else, that beings do thus somehow continue on during the intervals of their being perceived, he desired distinctly to recognize that fact. As, however, he could not, as an idealist, say they continued actually to exist while unperceived, he attributed to them what he called "a possibility" of existence, during the intervals when they were not actually perceived. An ordinary man regards objects perceived—such as a horse, a sofa, the moon, etc.—as independent external bodies affecting his senses and power of perception, and regards such objects while unperceived as being essentially the same, though temporarily not affecting his senses and powers of perception. Instead of this, Mill professed to regard the former (perceived objects) as each consisting of a bundle of sensations actually felt, and the latter (objects temporarily unperceived) as bundles of sensations which, though not actually felt, yet might be felt—*i.e.* as "permanent possibilities of sensation." Can this modification of idealism be regarded as an improvement on the old Berkeleyanism? We not only think that it cannot justly be so regarded, but that by this change Mill virtually abandoned idealism altogether, while yet attempting verbally to continue to adhere to it. He never explained what he meant by a "possibility of sensation." Yet the word "possibility" is absolutely unmeaning unless it refers to something else besides that which is conceived of as possibly becoming actual. The very use of that word, implies a belief in something which makes the "possible" become "actual." The

merely "possible," as long as it remains only "possible," can have no real existence, and is therefore nothing. But "nothing" cannot make itself something—cannot make itself actual. We have, then, according to Mill, "sensations actual" and "sensations possible." But he could not mean that actual sensations themselves were capable of bringing into existence other, as yet only possible, sensations. Neither could these other "possible" sensations bring themselves into existence, since, by the very hypothesis, they do not yet exist. Therefore, if his words are not unmeaning (which cannot be supposed of so accomplished a writer), there must be, according to his teaching, some third entity in addition to "sensations actual" and "sensations possible." There must, in fact, be some enduring entity which has the power of, and is the agent for, transforming merely possible sensations into actual ones. But an "enduring entity" is a substance, and this substance is something which can exist unperceived, since nothing can act which does not exist, and this enduring entity must be supposed to act in making sensations felt which, when it begins to act, are, by Mill's hypothesis, not yet felt. If, however, we are to believe in enduring substances which exist and act quite independently of being perceived, and certainly (according to Mill) act when they are not perceived, then it is difficult indeed to see why we should not adopt the ordinary realistic belief about bodies—which is just that. In plain language, Mill's "permanent possibilities of sensation" are, in fact, nothing more than so many real substances capable of exciting sensations, decorated with a new, misleading, and really contradictory name. He really believed, just as we do, in feelings and in a number of enduring bodies which are capable of modifying our feelings, and which can undergo changes, act as causes, and exist without being perceived. In other words, Mill's system virtually abandons idealism while verbally adhering to it.

Other popular forms of idealism.

Another view, which has obtained a certain popularity, professes to combat idealism, and to support what it denominates "transfigured realism;" and yet it ought to be reckoned as one form of that system which it professes to

oppose, for all its fundamental principles are those of idealism, and its conclusions only differ from those of ordinary idealists in being still more unreasonable. This system contends that "all we are conscious of as properties of matter, even down to weight and resistance, are but subjective affections produced by an unknown and unknowable objective agency, besides the existence of which we can know nothing but states of consciousness. Even such words as 'truth' and 'fact' are but names for certain states of consciousness, and although there is a definite relation between every change in consciousness and some energy of the unknowable, yet no relation in consciousness can resemble, or be in any way akin to its source beyond consciousness." Such "realism" as this, may well be called "transfigured." By it, quite as much as by idealism pure and simple, the world, as we know it, disappears even from our thoughts. Not merely sounds and sights, but the whole universe, including our own material frame, appears dissolved by it, leaving us vaguely floating in an unimaginable abyss of unknowable possibilities. To oppose idealism and then to offer us such realism as this, is like inviting hungry men to a feast, discoursing to them about meats and sauces, digestion and nutrition, and then taking them to a room furnished with nothing but diagrams of the chemical formulæ of different kinds of food!

But, in the pursuit of truth, we need not linger over the consideration of a system which denies that truth is anything more than a state of feeling, or that we can know absolute truth, since any system of the kind, inasmuch as it thereby denies the principle of contradiction,* must result in absolute scepticism, which, as we have seen, is folly. Any one who propounds such a system may be compared with a man seated on the branch of a tree, sawing it across between himself and the tree's trunk. The success of his efforts can but accomplish his own downfall.

But far more common and popular is a third view which is singularly inconsistent with itself. Professing to know nothing but sensations and faint revivals of sensations, those who adopt this third view yet believe—as a sort of faith—

* See above, p. 39.

in the existence of an independent material world, unlike our sensations, yet the cause of them. The men of this school do really believe in "material objects" and "physical states," as realities independent of their minds and of every one else's; but on their system of knowledge they can (since they say they can know nothing but states of consciousness) only get this belief of theirs by an act of blind and unreasoning credulity. Their idealism is a mere piece of intellectual thimble-rigging, a game by which the unwary onlooker is only too liable to be cheated out of his most valuable mental possession—his rational certainty. Men of this school sometimes, as did the late Mr. G. H. Lewes, represent every feeling or perception we have, as something unlike both what is external and what is internal. They regard it as a *tertium quid* resulting from the combined activity and interaction of both the subject and object, but resembling neither, just as water resembles neither the oxygen nor the hydrogen from the combination of both of which it results. But, in fact, our intellect has the power of subtracting its own subjective elements from the result. Let the perception be conceded to be made up of $x + y$; x being the ego, or self, and y the object. The mind has the power of supplying its own $-x$, and so we get (through the imagination of the mind and the object) $x + y - x$, or y pure and simple. The reader can easily convince himself that he really has this power. Let him consider how by looking at, touching, and handling two apples, he can obtain the assurance that they are really two; that as to this fact of number, his intellect guards him from self-deception occasioned by the activity of his own being. Let him further consider how, after having perceived them, he is absolutely certain he has done so, since he cannot believe he has at the same time both "perceived them" and "not perceived them" without violating the principle of contradiction, and so falling into utter scepticism and absurdity. Therefore, external objects and the mind itself, do not by their combined activity, produce a perception divergent from objective truth, and therefore the mind itself must either, as before said, have the power of subtracting from the resulting per-

ception every subjective element of its own which might mislead, or else must be what may by analogy be called perfectly transparent, transmitting to us a knowledge of facts and principles as they really and objectively exist. Grounding all our assertions upon the positive dicta of our intellect, we may affirm that we are conscious that in knowing things, we are enabled to really know the things themselves and not a mere amalgam made up of a mixture of things with ourselves, and neither really like us nor the world about us.

Perception an accident of bodies.

With respect to the contention of idealists that the essence of all "existence" is "being perceived," it may be contended that nothing which is perceived can exist in absolutely the same condition when unperceived as it does when perceived; for in the former case it is "a thing perceived," and in the latter case it is "a thing unperceived." It may also be said, since every existence we know of must be "an existence known by us," the existence of anything unknown to us cannot be quite the same as that of anything known to us. This contention must, of course, be allowed, but it is utterly trivial. Of course, things unknown cannot be known, while they exist as unknown objects, and, of course, a thing perceived by me does not exist in a state of "being perceived by me" when I do not perceive it. But my perceiving or not perceiving it is a mere accident of its existence, which existence continues on essentially the same, whether perceived or not. The impressions, sensations, and ideas derived from things, do not, of course, exist independently of the mind which has them, but the things which excite the sensations can and do exist externally to, and independently of the mind, as unthinking substances—things in themselves. The mere accident of "being perceived" is one which may even be absent indefinitely. Who has perceived, or will perceive, the mountains on the other side of the moon? Who perceived for untold ages the many fossil remains which have only of late years been disentombed? Does want of being perceived, impair the real existence of the millions of fossils yet undiscovered?

Objective concepts.

But if it is true that there is (as here urged, and as all

men but idealists believe) a real external world of varied substances which exist independently of the mind, it is evident that a relation of conformity exists between that external world and our own minds. It is evident that our own reason participates in a reason which must be admitted to exist, in some sense, in the world around us. That two and two make four; that the whole is greater than its part; that two parallel lines cannot enclose a space; that nothing can at the same time both be and not be; and that if all members of any class of existences have a certain quality, then anything which can be shown to belong to that class must also have that quality,—all these are truths, not only for our own minds, but for the objects about us also. This we can clearly see when we apprehend any such truths as, for example, that "two sides of a triangle are greater than the third," etc., we also apprehend that the cause of such truths does not lie in our understanding, but in external nature. As these truths exist in "our mind," or subjectively, they are so many "conceptions," or "concepts" of that mind; but they manifestly exist also as so many real relations between real things—that is, they also exist objectively. These external real relations, thus perceived, may be called "objective concepts"—a term which forcibly expresses their correspondence with our perceptions, or "subjective concepts." Correspondences of the kind are implied in every assertion we make about external objects. Thus, if we say, "A negro is black," we affirm not only the existence of a correspondence and conformity between our subjective conceptions of "a negro" and "blackness," and the objective realities—the real negro and his dark colour—but also a correspondence between our subjective judgment in the matter, and the objective co-existence of the negro and the quality we term "black." "Objective concepts," then, are those really existing things and conditions in the external world, to which our corresponding "subjective concepts" answer. They are that real existence or condition in any object, which corresponds to an abstract idea. If there were not objective concepts thus corresponding with our subjective concepts, not only all physical science, but all reasoning and intellectual inter-

course between men must come to an end. Without them we could not converse together intelligibly, or convey to each other any information whatever. There are, therefore, many relations in external nature which our intellect has the power of directly apprehending (on the recurrence of certain sense-impressions) as true—that is, as alike existing in the mind and in external reality. These relations do not merely exist in our subjective impressions, or merely in the things which produce those impressions, *i.e.* objectively, but in both simultaneously. They exist in our perceived impressions as forming part of a universe in which such necessary relations reign. Thus, the reason of the individual may be seen to have a participation in that universal reason which finds mute expression in the irrational universe, and express recognition in the human mind.

Materialistic idealism.

That "extremes meet," is a familiar saying, and some of the modifications of idealism constitute a striking illustration of its truth. That all existence is but a modification of mind, is the profession of orthodox idealism. That mind is but a passing, temporary product of what we know as matter, is the teaching of what is known as "materialism," and would seem to be the direct contrary of idealism. Yet a practical materialism is often the outcome and result of a professed idealism. A profession of absolute materialism is rare with us now, but that popular form of idealism last noticed* is, in fact, more to be reckoned as a singularly illogical form of materialism, based upon the persuasion (rather implied than avowed) that our idea of material substance is more satisfactory and trustworthy than any idea we can have of an immaterial substance underlying and supporting our successive states of feeling.

Our certainty, however, as to the existence of our substantial and enduring self, is, as we have seen,† fundamental and self-evident. Whatever may be said as to the existence of the body—and its independent existence is denied by idealists—the existence of the mind, it is absolutely impossible logically to doubt; for the very act of consciously denying it implicitly affirms both its existence

* See above, pp. 134, 135. † See above, pp. 17-28.

and our knowledge of its existence. We cannot say, "The mind does not exist," without knowing that we affirm and understand something, and whatever affirms and understands, must at least exist; while the only intelligent existence we directly and immediately know, is our own—our own mind. It is possible, without self-contradiction, to deny that there is an unintelligent, material substance—the body—co-existing with that which thinks and understands; but manifestly we cannot, without the utmost absurdity, think that our own being does not think. All, then, that any denial of the mind's existence can really mean, is a denial that there is any fundamental distinction between mind and matter. This latter denial is equivalent to an assertion that mind and matter are but two modes, forms, or modifications of something else which is different from both, and more fundamental. This latter assertion characterizes that way of regarding the universe which is known as "monism." According to this system, "thought" and "extension" are two attributes of one eternal substance which is different from both. This strange conception conflicts with the direct teaching of our intimate experience, which tells us that in our own being we may be aware both of that which thinks and gives us no sign of "extension"—the intellect—and that which does not think, but which is extended—such as various parts of our body—while we have no particle of evidence that there is anything in our being which is neither mind nor body, but which underlies both. Certainly a power of thinking is no attribute of our hands or feet, or of many other portions of our frame. We know also, if the independent existence of the external world be admitted, that we have on all sides of us a multitude of things—the air, the clouds, the water, and the soil—which do not in any sense think. Any one who affirms that in all this we are mistaken, and that these apparently unintelligent bodies have really some form of intelligence which escapes our ken, are at least bound to bring forward some very convincing evidence of the fact asserted. No such evidence, however, has been brought forward. To deny the distinction between what is intelligent and what is not intelligent is to deny a fact, the truth of which

Monism.

our experience continually assures us of; while to deny it, and at the same time to affirm that the only thing which really exists is something which is neither the one nor the other, is at the same time to deny what seems to us to be the plainest truth, and to affirm gratuitously a paradox which has no shadow of evidence in its favour. The theory of monism, however, will have to be further considered under the head of pantheism.* Yet another way of reconciling idealism and materialism has been proposed. According to this last mode, mind, in some rudimentary form, is everywhere diffused through the universe, each particle of matter possessing its share of a hypothetical substance, which has been called "mind-stuff." Such a belief, however, can be entertained only by those who for some reason desire to entertain it, or who neglect to note the differences between the objects they perceive, attending only to resemblances, or rather to the analogies, which they may happen to exhibit. We cannot, of course, prove that a table is not intelligent, any more than we can prove any other negative. But the common sense of mankind clearly apprehends that a table is not intelligent, and if a calculating machine be called "intelligent," it can only be so because it gives evidence of the intelligence which has been exercised in its construction. Common sense, however, judges that so to speak is to misuse words, and pervert their true meaning. As, however, we are here somewhat anticipating what has to be more fully stated in our twenty-sixth chapter, we desire to say no more than seems to us necessary in order briefly to bring to the notice of readers certain different modifications of idealism to which we think their attention ought to be called.

Such, then, is idealism in its oldest form and in some of its more recent popular manifestations in this country. We claim to have shown that it is not consistent with reason on two accounts: (1) it contradicts that conception of the universe which the advance of science makes more and more convincing and secure; and (2) it asserts that we have not that direct knowledge of the world about us which our own minds assure us we certainly have.

* See below, chapter xxvi.

Reviewing our progress thus far, we may, it seems, affirm—if the reasons here urged are valid—that by building upon the direct declarations of consciousness as a foundation, we can be certain that we really know an external world, and many qualities of independently existing things, and not merely our own feelings, or a mere amalgam made up from ourselves and from external bodies. In this way the teachings of science can be seen to harmonize absolutely with the dictates of reason, while on the idealist hypothesis they can only be accepted through an act of blind, unreasoning credulity.

According to the arguments hitherto advanced, we may repose securely in our spontaneous trust in the truthfulness of our faculties, when matured and employed with attention and care in the quest of real and objective truth. We may be absolutely certain that an external world really exists independently of us, and that its various parts really possess those very powers and properties which our senses and our reason combine to assure us such objects do in fact possess. The proof of realism gives validity* to human testimony and the dictates of common sense, and supplies us with the means of apprehending a countless multitude of clearly evident facts of the greatest use to us in the investigation of our own nature and of the world about us, to which we may now proceed successively to address ourselves.

* See above, p. 65.

SECTION III.

MAN.

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CHAPTER XII.

STRUCTURE OF THE BODY.

Some study of the structure and activities of the body—which is an organism—is necessary for a full comprehension of our mental powers. Its structure must be considered first, and especially that of the nervous system, which, like all the other bodily systems, is composed of organs, tissues, and cells. Our body exhibits certain rudimentary structures and various noteworthy conditions as to symmetry, also different orders of resemblance and contrast between its various parts.

A knowledge of the body necessary to a full knowledge of the mind—Its structure to be studied before its functions—Systems, organs, tissues, and cells—Organs of sense—The nervous axis—Rudimentary structures—Symmetrical relations and homologies.

HAVING, in the last section, justified our natural confidence in the testimony of the senses and understanding about the external world, we may now securely proceed to the investigation of our own nature and the world about us, commencing with the former.

A knowledge of the body necessary to a full knowledge of the mind.

The object of this work being an inquiry after truth, it must, of course, always be more or less directly concerned with human thought, since "truth" consists in an accurate correspondence between thought and things external.* In the present section it is proposed to apply ourselves especially and directly to the examination of thought and of all human mental activity. But "thought," as we know it, is only carried on by the help of a living body and depends for its continuance on that body's life, and therefore on the due performance of those bodily activities without

* See below, chap. xvii., "Objectivity of Truth."

which life cannot be maintained. To have anything like a full comprehension of our powers of thinking, then, we should be acquainted not only with the inferior forms of our mental activity, but also with those bodily activities which are thus indispensable for their performance. But it is impossible to understand how any structure or mechanism acts, unless we also know something of the order and arrangement of its parts. Therefore, we cannot adequately understand the human mind, unless we are somewhat acquainted with the structure of the human body, and with the different kinds of activity it displays. The human body is obviously a complex structure, consisting of different parts, which act in different ways and reciprocally minister to one another. Thus, for example, the actions of the organs of sense, and of the limbs, serve to convey food into the interior of the body, where it is converted by the digestive organs into nutriment, which is distributed throughout our frame by an elaborate system of canals, or "vessels," and by this means those vessels themselves, as well as the digestive organs, limbs, and organs of sense, are all nourished and maintained in due working order. Thus the body is a complex whole, whereof the various parts are reciprocally ends and means, and such a body is called an "*organism*."

Its structure to be studied before its functions.

Accordingly, our body requires to be considered, for our present purpose, from two points of view, and its study needs to be followed up along two different lines of inquiry. One of these refers to its structure, and the other to the actions which it performs—that is, its "functions." As before said, a knowledge of structures must precede a knowledge of functions; and, accordingly, this chapter will be devoted to a brief statement of those main facts respecting man's bodily organization which seem most needful for the comprehension of such of its functions as we are concerned with.

Nothing is, of course, more familiar to us than the general external form of the human body. The leading facts as to its internal structure are also matters of common knowledge. Thus it is almost superfluous to say that beneath the skin lies the "flesh" of the body, which

more or less completely wraps round the bones of the head and trunk—that is, the skull, backbone, and ribs—and those of the limbs. Within the trunk is a cavity, wherein lie a variety of parts, known as the heart, lungs, kidneys, stomach, intestine, liver, etc. Within the skull and backbone is enclosed a mass of white substance—the brain and spinal marrow. Delicate threads of similar substance (nerves) and tubes of various sizes (vessels) traverse the body in all directions.

Systems organs, tissues, and cells.

Each of the considerable parts of the body, such, *e.g.*, as the heart, stomach, lungs, eyes, ears, etc., is termed an "organ," and different organs are arranged together in groups, into "sets" or "systems" of organs. Thus there is the "alimentary system" made up of mouth, œsophagus (or gullet), stomach, intestinal tube—together forming the alimentary canal—with the liver and pancreas thereto annexed. The circulating system, again, consists of the heart and all the various vessels directly or indirectly connected with it. But just as "systems" are made up of "organs," so each "organ" is made up of several different substances, variously blended, and differing in their minute, microscopic characters. Each such distinct substance is called a "tissue." Thus "fat" is "adipose tissue"; "flesh" is muscular "tissue"; the outermost layer of the skin is made of "epithelial tissue," and its deeper layer of "connective tissue." Bone is "osseous tissue," and the brain and nerves are formed of "nervous tissue." Finally, each tissue is either made up of certain very small structural elements, termed "cells," or of parts which have been derived from and represent cells—a cell being a minute particle of a soft substance called "protoplasm." These cells, or parts derived from cells, compose the ultimate substance, or "parenchyma" of the body, so far as our powers of observation at present extend; but these by no means enable us really to understand the absolutely ultimate composition of our bodies. Chemistry enables us to resolve the bodily tissues into certain inorganic substances, which are called "elements," because they have not yet been shown to be of composite nature; and "protoplasm" can always be reduced to four such elements,

namely, oxygen, hydrogen, nitrogen, and carbon. A very large part of the human frame is made up of water, the brain containing about seventy per cent. of that fluid.

The component substances of the body are grouped in two classes, according as they can or cannot be shown to contain a gaseous element known as nitrogen. To the former, or nitrogenous group of substances, belong our flesh, our blood, nervous tissue, and most of the constituents of our frame; but fat is an example of a non-nitrogenous substance. The body may first be reduced to what are called its "proximate elements," such as *albumen* (the substance of the white of egg) and gelatine (the substance of jelly), both nitrogenous. The body is ultimately reducible to the before-mentioned elements, oxygen, hydrogen, carbon, and the nitrogen, and to certain other elements which are present in much smaller quantity.*

The whole structure of the body is bounded externally by the skin, and is internally supported by that solid framework of bones and cartilages known as the skeleton. Its parts are mostly capable of being moved one upon another; and, to facilitate these motions, the contiguous surfaces of such movable bones are so shaped as to form what are known as "joints." The most important part of the skeleton is the skull and backbone (or vertebral column), which contains an elongated cavity continuous with the cavity of the skull. From either side of the backbone the ribs proceed forward towards the breast-bone. Each limb contains long bones, which support the arm or the leg, the short bones of the wrist or the ankle, the five bones of the palm of the hand or sole of the foot, and the bones of the fingers or toes. The limb-bones are attached to the back and breastbones by two bony girdles. The arm-bone girdle is formed of the collar-bones and blade-bones. The girdle to which the thigh-bones are articulated is more complete and solid, and is known as the pelvis. The flesh which invests the skeleton consists of a multitude of most delicate threads, called "muscular fibres," which

* If the whole body be supposed to consist of 100 parts, there will be 72 of oxygen; 9·1 hydrogen; 13·5 carbon; 2·5 nitrogen; lime and phosphorus a fraction above 1, and other substances the remaining fraction.

are variously aggregated in masses to form "muscles" of different shapes and sizes—muscles of the limbs, muscles of the trunk, muscles of the head and jaws, etc.—which are generally attached by one or by both ends to different bones. Muscular fibres are present in large numbers in the walls of the alimentary canal. The alimentary system has been already mentioned. The circulating system has also been briefly adverted to. It consists of a muscular, four-chambered structure—the heart—which is the centre of two sets of tubes progressively decreasing in diameter, and known as arteries and veins, which have muscular fibres in their membranous walls. Minute vessels, termed capillaries, connect the extremities of the arteries with the veins, while another set of vessels, known as lymphatics, proceeding from all parts of the body, converge and unite with two large veins. The arteries, veins, and heart are full of a fluid "tissue"—the blood—and the lymphatics of a fluid called lymph. These fluids contain a multitude of minute bodies, termed "blood corpuscles," which may be white or red. Only white corpuscles are contained in the lymph, but the immense majority of those in the blood are red, and its colour is due to them. The lungs are two very complexly formed air-bags, while a tube, known as the windpipe, and which is connected above with the back of the mouth, bifurcates below, each bifurcation further dividing and subdividing within the lung into which it enters. These together constitute the respiratory system of organs. The kidneys are two rounded masses of minute tubes, which converge to open into a cavity, whence two very much larger tubes—one to each kidney—pass down to the bladder, and thence a single tube extends to an external aperture. Various parts of the body—such, *e.g.*, as the back of the mouth, the middle passage of the nose, the windpipe, etc.—are lined with epithalium, which is coated with very minute hair-like processes, termed (for a reason which will hereafter appear) "vibratile cilia." The sexual, or generative system, essentially consists, in the male, of very minute tubes, containing what are called sperm-cells, and peculiar filamentary portions of cells. In the female, it consists of an apparently non-tubular parenchyma, containing certain

modified cells, termed "ova." The nervous system is the assemblage of bodily organs which the most concerns us here. It consists, in the first place, of the brain and spinal marrow (or spinal cord), which together constitute what is called the central part of the nervous system, or the nervous axis. Besides this, the nervous system consists of an immense multitude of cords and threads of nervous tissue —the "nerves"—which proceed out from the axis of the nervous system to all parts of the body. Certain special nerves proceed from the brain to the eye, the ear, the nose, and the tongue, and are there distributed.

Organs of sense.

The eye essentially consists of a very delicate expansion of nervous tissue, called the retina—which is directly continuous with the brain by means of the optic nerve—and which has in front of it three transparent media of different densities enclosed within the skin of the eyeball, which is transparent anteriorly. The organ of hearing, or internal ear, is a complexly-shaped, delicate membranous bag, called the "labyrinth," containing fluid, and floating in another fluid enclosed within a dense bone of the skull. The auditory nerve, passing outwards from the brain, distributes its ultimate ramifications on the walls of the membranous bag. The nasal organ is composed of minute branches of the nerves of smell (olfactory nerves), which proceed, from a prolongation of the brain, outwards to the moist membrane lining the uppermost part of the cavity of the nostrils. The organ of taste consists of the tongue and hinder portion of the palate. These parts are supplied with branches of two gustatory nerves from the brain, named trigeminal and glosso-pharyngeal respectively. The organ of touch is the skin, including the very delicate nerve fibres which are supplied to it from the nervous axis.

The nervous axis.

The spinal cord consists of two lateral halves, and nerves, called spinal nerves, are given forth symmetrically in pairs (one right and one left) from each lateral half of it. Each spinal nerve of every pair, arises by two roots, one anterior in position and the other posterior, and each root is made up of a number of small bundles of nerve fibres. The fibres from the hinder and from the anterior part of each

lateral half of the spinal cord, are mixed, and run together in the nerves, but those from its anterior half go especially to the muscles, and those from its posterior half to the skin.

The brain, or the enlarged summit of the nervous axis, consists mainly of two very unequal parts, termed respectively the large brain, or *cerebrum*, and the little brain, or *cerebellum*. The cerebrum is divided by a deep median groove into two lateral halves, called the hemispheres of the brain, of which they form the whole very much convoluted upper surface. The cerebellum lies beneath their hindermost parts. The spinal cord is continuous with the brain at what is called the medulla, whence the axis mounts upwards and diverges to form the hemispheres, having the cerebellum behind it. A minute longitudinal cavity traverses the spinal cord, and is called the "central canal." It expands within the brain into four continuous, complexly formed cavities, termed "ventricles." The greater number of the nerves which proceed from the brain have their origin in the medulla, and this is notably the case with those which go to the lungs, stomach, and heart. *Rudimentary structures.*

From the anterior and posterior surfaces of the cerebral part of the nervous axis project two small rounded bodies, termed respectively the "pituitary body" and the "pineal gland." They are examples of certain parts distinguished, for reasons which will hereafter appear,* as "rudimentary structures." Another rudimentary structure, formed in connection with the intestine, is known as the vermiform appendix; and other such structures exist in connection with the organs of generation.

We have described the body as consisting of different systems of organs, composed of tissues and cells; but by this all that has been meant is that it can be more or less readily divided into such parts. In reality, the body forms one continuous whole, which assumes different appearances and possesses different properties in different parts. Even the blood is directly continuous with the other constituents of the body in all actively growing parts. Thus the body of each adult human being may be said to be one

* See below, chap. xxii.

enormously large cell, the contents of which have become very complex and diversely conditioned.

Symmetrical relations and homologies.

It is desirable to note the existence of certain symmetrical relations and contrasts between different parts of our frame. Thus there is an obvious contrast between the dorsal (or posterior) and the ventral (or anterior) aspects of the body, and this contrast extends along each limb to the ends of the fingers and toes respectively.

Again, there is a resemblance, or homology (and at the same time a contrast), between the right and left sides, which correspond with tolerable exactitude one to the other. This kind of harmony is termed *bilateral* symmetry, or homology. Though obvious externally, it does not prevail in all the internal organs (or viscera), some of which are more or less unsymmetrically disposed.

There is a third order of resemblance, or correspondence, namely, that which exists between parts placed in serial succession. We may find an example of this in the correspondence which exists between the parts of the upper limbs and those of the lower extremities, which may be said to succeed the former inferiorly. Thus there is a *serial* symmetry, or homology, of the upper arm with the thigh, of the elbow with the knee, of the lower part of the arm with the leg, of the wrist with the ankle, of the palm of the hand with the sole of the foot, and of the fingers with the toes—the thumb agreeing with the great toe in having only two bones within it, while each of the fingers and other toes has three. This serial symmetry which is thus visible externally, becomes much more evident when the interior of the body is examined. Thus we find that the backbone is made up of a number of osseous pieces which obviously resemble each other very closely, and so bear a common name. Each such bone is called a "vertebra," on which account the backbone is often called the vertebral column. The same is the case as regards the "ribs," which also follow one another in "a series," and thus have a serial resemblance, or "homology," as it is often termed. Parts which possess a serial homology are often distinguished as "serial homologues," or "homotypes."

The term "homology" refers only to structural relations

and resemblances as to relative position, and has nothing whatever to do with the use to which parts may or may not be put.

There are certain very curious facts which point to some deep and hidden cause of serial homology, of a more profound nature than any similarity in the use to which serially homologous parts may be applied. Thus certain diseases will attack the palms and soles of one individual and the backs of the hands and feet of another individual. Similar deformities also are often to be found simultaneously in the thumbs and great toes of the same persons, or between their little fingers and little toes. These curious conditions, and serial homology as it exists in us, will be further illustrated when we come to consider the structure of the lower animals,* where also we shall find that some of them have the body built up symmetrically according to a third and quite different kind † of symmetry.

* See below, chap. xxi., "Arthropoda."
† See below, chap. xxi., "Cælentera."

CHAPTER XIII.

THE ACTIVITIES OF THE BODY.

The functions of the body vary with its structure, a classification of "functions" corresponding with a classification of its parts. There is a close analogy between the main functions of whole systems of organs and the vital powers possessed by the minute portions of protoplasm which build them up.

Muscular activity—Co-ordinated motions—Non-muscular motility—The alimentary function—Activities of the circulating system—The respiratory function—The function of secretion—The generative function—Functions of the nervous system—Repair of injuries—Development—Heredity and variation—Habit—Instinctive actions—Death and life.

HAVING briefly reviewed those facts which most concern us here, respecting man's bodily structure, we have next to consider the actions, or functions, of the body and of its various parts. The body is, as we have seen, made up of "systems" of parts, each system consisting of certain aggregated "organs," each organ being made up of different "tissues," and each tissue being composed of "cells," or parts representing cells. Obviously, therefore, we may expect to find activities of corresponding orders—namely, of cells, of tissues, of organs, and of systems, in addition to such activities as belong to the entire living body, regarded as one whole. But none of the functions of the body can be performed except under certain physical conditions. There must be a sufficient, but not an excessive, degree of heat, a certain amount of moisture, and a certain supply of gaseous material. The existence of certain amounts of such forces and conditions are obviously necessary for life.

Muscular activity.

We may begin our examination of the functions of bodily life by considering bodily activity *par excellence*—movements of the limbs and other parts, and of the body as a whole. Walking, running, jumping, and the various movements of the larger and smaller parts of our frame, are all effected by the action of muscles of different kinds, shapes, and sizes. The muscles act by "contracting," and their contraction is due to a power which the fibres that compose them severally possess of simultaneously decreasing in length and increasing in diameter, on the occurrence of certain conditions and excitations. This power possessed by muscular tissue is a special form of irritability, which is called "contractility." By their contractions, muscles move the bones to which they are attached,* causing them to act like levers of different orders, and so to produce conspicuous bodily movements, such as those of our limbs, our head, our lower jaw, etc. The contracted state of any muscle can only endure for a limited time, and cannot be repeated without an interval of rest, which must be greater according to the exhaustion induced by frequently repeated contractions. There is one muscle, however, which acts throughout the whole life, its contractions being continually reiterated—a short interval of rest taking place after each contraction. This muscle is the heart, and it is an example of muscles which contract automatically without our knowledge and independently of our will. Such activities are to be carefully distinguished as "involuntary" activities, from our "voluntary" movements. There are some motions, such as those of respiration, which ordinarily take place independently of our will, but which can be performed voluntarily, and for a time be voluntarily suspended. Soon, however, the power of voluntarily restraining them ceases, and they take place in spite of all our efforts to the contrary.

The agent which induces muscular contraction is called a "stimulus," and there are various kinds of *stimuli*. Thus, there may be a direct stimulus, such as the application to the muscular fibres of a sharp-pointed body, or of an acid, or some acrid substance, or of sudden heat or cold, or

* See above, p. 149.

a shock of electricity. There may also be an indirect stimulus, *i.e.* when the excitation is supplied not directly to the muscular tissue of a muscle, but to the nerves which are distributed to it; or there may be a mental stimulus due to emotional excitement, or to the influence of an act of our will. It is a noteworthy fact that stimuli, physically equal, have a more powerful effect when acting on a muscle through a nerve, than when acting directly on the muscle itself.

A certain moderate, involuntary contraction of the muscles (called their "tonicity") is habitual. Were it not for this we could not stand without a great voluntary effort, on account of the flexibility of our joints. We maintain our upright posture as easily as we do, because the muscles placed on opposite sides of our body and legs are contracted to this normal degree. They thus antagonize each other, and so prevent the joints from giving way and allowing the body to fall to the ground, as it infallibly does when their action is suddenly arrested—as by a bullet through the heart. During waking life, and in sleep-walking, changes of posture which tend to cause the centre of gravity to fall beyond the basis of support, are instinctively followed by compensating motions which have the effect of retaining it within such basis. Thus, if the left leg be extended outwards, the body instinctively and simultaneously leans over to the right. Motions begun with a voluntary effort may be subsequently carried on automatically, as we constantly find when we set out for a walk. Such motions may be carried on much better automatically than with attention; as is easily seen if we begin to consider what our movements should be while we are running up stairs. Attention impedes the rapidity and accuracy of such movements.

Co-ordinated motions.

Thus not only do muscular motions take place without our adverting to them (as well as in response to a direct act of our will), but they take place in appropriate groups of co-ordinated movements and groups of groups of such movements, which not only we do not will, but which we do not even know. How wonderful, when we carefully consider it, is the trivial act of a lad throwing a stone at

a mark! How complex must be the co-ordinated movements between different parts of the body in order to produce even such a result! The lad's mind has little to do with it beyond the one impulse to hit the mark. He knows nothing of anatomy, but simply sets going the wonderful mechanism of his body, and this works out the desired effect for him, just as if it were only an elaborate machine. In the first place, the various movable parts of his eyes must be so adjusted that he may see the mark distinctly. Then his body must be held in a proper position, the stone be grasped with fit strength (that is, certain muscles must be contracted to a given amount), the arm must be thrown back to the due extent, and its muscles contracted, in co-ordination with the movements of the eyes, and with just that degree of vigour which, as his fingers are relaxed, will carry the stone as desired. Thus movements may be synthesized without our will and without our knowledge—so as to result in the production of one complex general action.

Various other motions may also take place unconsciously. The movements of the heart and those of respiration have been already adverted to, but, besides these, there are continual movements in the walls of the stomach and intestine, which are constantly renewed during life, and movements of contraction and relaxation in the walls of the blood-vessels—movements which serve to regulate the amount of the life-giving stream which different conditions induce them to transmit to different parts of the body.

Non-muscular motility.

But besides these movements of muscular tissue, the minute protoplasmic constituents of the body have also a certain power of motion. Thus the white corpuscles of the blood have a power not only of simple expansion and contraction, but also of protruding and withdrawing portions of their substance, and thus changing their shape in the most various ways. This kind of motion is termed "amœbiform," because it is quite like the motions which certain microscopic organisms, termed *Amœbæ*,* perform. The cilia, also, which have been already spoken of† in

* See below, chap. xxi. † See above, p. 149.

reference to the air passages of the body, have a peculiar power of motion—whence they get their name of "vibratile cilia." They perform repeated lashing movements, each cilium bending itself with great rapidity, and then becoming more slowly straightened. All the adjacent cilia move in the same direction, thus together producing a wave-like motion similar to that exhibited by a field of corn under a strong wind. The result of these constantly repeated movements is to propel small particles along the ciliated surface of the body.*

If a minute portion (a cell) of ciliated epithelium be detached, so as to float freely in some suitable fluid, then the effect of the lashings of its cilia is to move above the cell itself as by a sort of locomotion, like that of some very lowly animals and plants. No muscular tissue or nerve exists in any of these minute motile particles, and the cause of the motions is as yet quite unexplained and mysterious, like that of the contractile power of muscular tissue.

The alimentary function.

The activities of the organs which together constitute the alimentary system, combine to effect the nutrition of the body and such growth of its various parts as may be needed to compensate the wear and tear of adult life, or, in the immature individual, to minister to that development by which the human frame is built up. The process of nutrition effected by food is, in early life, greatly in excess of waste, and hence the body is said to "grow," and visibly increases in size with rapidity. Growth, however, takes place during the whole of life, though, at maturity, an equilibrium is established between growth and waste, so that the body ceases visibly to grow. With the advance of age, the balance at first existing is reversed, and waste becomes more and more in excess. The growth of the whole body takes place by the growth of its component tissues, and the growth of each tissue is brought about by the multiplication of the cell-elements which compose it. These, through nutrition, augment in size, and then subdivide themselves; and it is by this reproduction of

* This resembles the action of certain lowly animals known as *Flagellata*, see below, chap. xxi.

cell-elements that the tissues grow. The taking into our frame of the materials necessary for such reparative and nutritive growth, is called *alimentation*, and is finally effected by the reception of new elements into the very ultimate substance, or parenchyma, of the body. This final process of reception itself is termed *assimilation*, and consists in the transformation of what is immediately external to the most intimate substance, or parenchyma, of the body into the parenchyma itself—the change of the food we eat into our own flesh and blood. As to this process, science, as yet, can only say that it is performed, and enumerate the parts and processes which aid its performance. How it is performed, after all the preliminary actions are gone through, is at present an entirely unsolved problem.

Nevertheless, certain physical conditions help us to understand the processes which serve and lead up to the final act of assimilation. Assimilation is always effected from a fluid medium derived from the food; but in order that the food should be able to supply the body with such a medium, it must, sooner or later after its reception, undergo a certain process of preparation. Thus the whole process of nourishing the body by food—the process of alimentation—is made up of four subordinate processes: (1) the reception of the food; (2) its preparation by mechanical division and solution; (3) the action upon it of the digestive juices *—such as the saliva, gastric juice, and the fluids formed by the intestine, liver, and pancreas; and (4) its assimilation.

A supply of nutriment is, however, by no means all that is requisite to maintain life. It is also necessary that a certain temperature should be kept up by a constant process of oxygenation † of the body's substance, and so we need food for the production of heat as well as for nutrition.

But nutrition could not be effected were not fresh nutritive material conveyed all over the body to replace wear and tear; and it is so conveyed by the circulating

* These juices so act on the food as to change many of its component parts from an insoluble to an easily soluble state. To change them, that is, from "colloids" into "crystalloids." See below, chap. xx. p. 304.

† "Oxygenation" is union with oxygen, as when iron "rusts," and chemical action is a cause of warmth (see below, chap. xx.).

system—the system of blood-vessels or vascular canals. Yet, however copious and persistent may be this supply of nutriment, nutrition could not take place had not the various substances of the body the power to extract nutritive material from the blood and build it up, each into its own kind of substance—whether it be nervous tissue, muscular tissue, epithelial tissue, or what not. These various substances do not, of course, exist as such in the blood; it is the different tissues which have the power of changing some of the nutriment contained within it into their own tissue. Thus the living particles which form the ultimate substance of the body, exercise a certain power of choice with respect to the contents of the fluids which come in contact with them. Such particles are not passive bodies, they are active living agents. But, in fact, it is not the blood alone which is in all cases the direct agent of nutrition, since the blood has the power of replenishing itself and repairing its own losses, out of the fluids obtained from the food. The intimate way in which assimilation takes place is called *intussusception*, to distinguish it from any growth which may take place by mere external addition—as when a crystal grows,* while suspended in a suitable medium, by the deposition of fresh matter on its surface. Thus the ultimate protoplasmic elements of the body have a power of converting other adjacent substances into material like themselves—into their own substance. Inasmuch also as the heat of the body is produced and maintained by the oxygenation of such ultimate elements, they must, besides this, also possess a power of executing chemical changes, and so evolving heat more gently and continuously than in the combustion of inorganic bodies.

Activities of the circulating system.

The activities of the circulating system of parts,† consist in the conveyance of the nutritive fluid—the blood—to and from every part of our frame. That it should be so conveyed is a manifest necessity of life, for since the process of nutrition takes place in the very innermost substance of the body, there must be channels by which every part of the body may be supplied with its needed nutriment. It also requires to be driven from space to space, that it

* See below, chap. xx. p. 304. † See above, p. 149.

may go wherever it is wanted; and, to effect this, active "organs of circulation" are needed, whereof the heart—the great propeller—is the chief. The blood exudes from the finest ultimate ramifications of the blood-vessels in order to reach the parenchyma of the body, and to supply it with its rich nutritive material for assimilation, repair of waste, and growth.

But the blood, in and by the very act of nourishing the various organs, must part with its nutritive material, and this, therefore, requires to be replenished if life is to be sustained. The needful gaseous matters are obtained, as will shortly be pointed out, by respiration; but the other matters have to be gathered by the blood from the materials prepared for it within the alimentary canal, whence they pass into the blood channels by the intervention of the lymphatic vessels, which, as before said,* ultimately open into the large veins. The arteries are vessels which carry the blood from the heart all over the body, whence it returns by the veins to that central organ.

Besides the circulation of the blood throughout the body, a minute internal circulation, or movement of parts of its substance, must also take place within each protoplasmic particle of the body, similar to that which takes place in certain minute living organisms, whose whole bodies consist each of a minute particle of protoplasm only.

The respiratory function.

Of all the functions of the body, that of *respiration* is the most conspicuously necessary for the maintenance of life. The life of each separate individual begins with an act of inspiration, and with an act of expiration it ceases. Let the function of respiration be interrupted for a very short time, and death is the necessary result. In breathing, the air is taken down the windpipe into the lungs, and is thence again expelled much poorer in oxygen gas, but much richer in carbonic acid. It is this absorption of oxygen by the body and discharge from it of carbonic acid instead—this interchange of gases between the living animal and the surrounding air—which constitutes "breathing," or respiration. But in carrying on this function we really perform two processes of respiration

* See above, p. 149.

—one "internal," the other relatively "external." Such is the case, because the oxygen received into the blood does not remain there, but is carried by the circulation to the remotest recesses of our body, to unite with its innermost parenchyma. Similarly, the carbonic acid which the blood sets free, does not originate in the blood, but is given forth into the blood from all the ultimate particles of the same parenchyma. Thence the blood gathers it, and conveys it outwards for discharge in the lungs. The blood thus both gives out and takes in oxygen and carbonic acid at either end of its course to and fro between the lungs and all parts of the body. It goes from all parts of the body to the heart, and is thence propelled to the lungs, where it gives out its excess of carbonic acid into the air contained within them, and takes thence oxygen in exchange. *Internal respiration*, therefore, is the absorption of oxygen and elimination of carbonic acid by the ultimate parenchyma of the body's substance. *External respiration* is the absorption of oxygen and the elimination of carbonic acid by the blood, on what is essentially the surface of the body; for the always moist lining of the lungs is but, as it were, a very deep and complex inbending and infolding of the body's external surface.

Thus we may here again note, as we before noted with respect to other activities of the body, that the protoplasmic elements of the body have themselves a power of respiration—of effecting that very gaseous interchange just described.

The function of secretion.

But, closely connected with respiration and nutrition, there is yet another bodily activity to be described, namely, *secretion*. We have, in fact, already noted that the process of respiration is in part a process of elimination and removal from the body of a portion of the waste products of its vital activities. This now requires more careful consideration. Bodily life is carried on by a series of compositions and decompositions, and, in order that assimilation may take place, a process of disassimilation must accompany it. With the addition of new and unused material, there must go on a subtraction of old and effete material. It has already been observed that the digestion

of our food is aided by juices, such as the saliva, gastric juice, etc. Now, these juices do not exist as such in the blood, but are formed from it by a mysterious power which certain cells possess thus to build up new products. The exercise of this power is called "secretion," and it is a power analogous to that by which the various tissues are enabled to add to their own substance from the life-stream which bathes them, though their substance does not exist, as such, in that stream. Thus "assimilation" itself is a sort of "secretion." Nevertheless, it cannot be said that "secretion" is a sort of "assimilation." "Assimilation" is a process of forming products and adding them to the body; but "secretion" is a process of forming products which are either to be got rid of, or else are destined to aid in other life-processes. Thus secretion is a special function, and as such has a special organ—a gland. Two most important glands of our body are the kidneys, which secrete and remove from the blood certain effete and deleterious nitrogenous substances, which they discharge and pass on into the bladder. But we are also compelled to recognize that a power of "secretion" is possessed by the ultimate protoplasmic elements of the body, just as we have seen them to possess other before described functions. For it is they which ultimately do the actual work of "secretion." Therefore such particles have the power of forming from their own substance other substances of a different nature. This power, possessed by particles of protoplasm, is especially conspicuous in the process of "development." * Thus we see how close is the analogy between the main functions of whole systems of organs, and the vital powers possessed by the minute particles of protoplasm which go to build up the body.

The generative function.

The generative function is a special modification and form of "growth." Nutrition is a sort of self-generation; and this is especially striking in certain cases of bodily repair after injury.† In ordinary growth there is, as we have seen, a sort of reproduction; for it is by the reproduction, or multiplication, of the component cells of the various tissues that their growth is effected. There is, then,

* See below, p. 171. † See below, p. 169.

nothing very wonderful in an organ forming cells which, instead of remaining part of the tissue which formed them, and so causing it to grow, become detached from it. Nevertheless, though generation may be said to be a kind of growth, yet it is a very special and peculiar kind of growth. For it is effected, in us, by the formation of two kinds of cell-elements, which have a reciprocal relation one to the other, and each kind is in its separate way very remarkable. The male or sperm cell, gives rise to the before-mentioned actively locomotive filamentary particles, whereof each one which attains the end of its being, merges itself in a cell of the other kind. This second kind of cell, the female generative cell, or ovum, is one not only capable of self-division and multiplication, but of growing up, after the merging process just mentioned, not into a single organ only, but into a perfect human being. Thus is brought about (the requisite conditions being supplied) nothing less than a cycle of changes—the cycle of life—*i.e.* a series of changes returning to the point from which that series set out. We have (1) the generative cell; (2) its upgrowth into the form of a fully developed embryo; (3) the birth of an infant; (4) childhood; (5) adolescence; and (6) maturity, where we have the formation of the generative cell once more. This cycle of changes, like every other process of bodily life, needs for its due occurrence certain fixed conditions, such as a certain temperature, a due supply of oxygen, a sufficient amount of food, the presence of a requisite degree of moisture, and, of course, protection from directly destructive agencies, animate or inanimate. The general features of this wonderful kind of growth from the ovum, constitute what is called the process of development, and its consideration, with that of the process of repair after injury, will occupy us at the end of this chapter.

Functions of the nervous system.

It will be well here to consider the activities of the nervous system, and certain other activities more or less analogous thereto, or connected therewith. It is by the living agency of the nervous system that all the other organic activities of our body are carried on. Without its aid all nutrition, growth, circulation, respiration, secretion,

generation, or muscular motion would be impossible for us. But besides these organic activities—activities which, muscular motion apart, we share, not only with animals, but also with plants—the nervous system also ministers to, and is necessary for, sensation, and, therefore, for all our cognition, since, as we have seen,* knowledge is impossible for us except as following upon sensation. The nervous system is thus an intermediary between us and the world about us. It receives various influences from the latter which give rise to corresponding sensations in us, and to bodily movements, which react on the world about us. But besides these actions, it also serves as an intermediary without the intervention of sensation, since, when it is acted upon by external influences, it may, and constantly does, excite corresponding activities in our body without giving rise to any feeling of which we are conscious.

Sensation is incapable of definition, since to be understood it needs to be experienced; and every man must know what it is to have a feeling who knows anything whatever —as "sensations" are with us the indispensable antecedents of ideas, and, therefore, of knowledge. All consideration of sensation, as recognized by consciousness, must be deferred till we come to speak of the faculties of the mind, and to consider it subjectively. Here we may, however, at once describe it as a special and altogether peculiar vital organic activity, which accompanies certain actions of the nervous system occurring under definite conditions. Thus the temperature of the body must be moderate (certainly not less than 72°, or more than about 120°); the nervous tissue must be adequately supplied with oxygen, and free from deleterious substances, and the more important nervous structures themselves must not have their continuity interrupted by any injury.

Different parts of the nervous system have different functions, and the special functions of different nerves, are partly learned by the study of their distribution and partly by the very simplest observations. Thus irritation of the nerves which go to the eye (to the retina) or to the internal ear, does not produce pain, but only certain sensations

* See above, p. 87.

either of light or of noise. There is a great nerve, called the pneumogastric, which passes down on either side from the brain to the heart, lungs, and stomach. If it be divided the stomach ceases to move, its power of secretion is impaired, the lungs become paralyzed, and suffocation ensues; but the beating of the heart is accelerated, so that we conclude its normal function is, in part, to moderate the heart's action. The nerves which come forth in pairs* from the spinal cord minister either to sensation or to motion, according to their distributions and connections. If one of these nerves be divided, and the part cut off from the spinal cord be irritated, then motion ensues in the muscles to which such nerve is distributed, but no pain accompanies such irritation. If the part which remains attached to the spinal cord be irritated, then pain is caused, but not motion. If the posterior root† of a spinal nerve be alone severed, the parts supplied with twigs from such nerve only, lose their sensibility, but their power of motion remains. If the anterior root of such a nerve be alone divided, then the parts supplied by such nerve are paralyzed as to motion, but, nevertheless, retain their sensibility. If the spinal cord itself be cut or broken through, it is impossible for a man thus injured to feel any irritation which may be applied to the parts of his body which are supplied with nerves coming forth from the spinal cord below the point of injury. Neither can he voluntarily move such parts. Nevertheless, movements of those parts may be produced by stimuli applied to them, without the occurrence of either conscious sensation or voluntary effort. A man so injured, though he may have entirely lost the power of feeling any pricking, cutting, or burning, applied to such parts, will none the less execute movements, often in an exaggerated manner, in response to such stimuli, just as if he did feel them. He will withdraw his foot if tickled with a feather, just as if he felt the tickling which he is incapable of feeling. Such unconscious movement in response to stimuli which are not felt, is called *reflex action*, for the following reason: Under ordinary circumstances, stimulations of the surface of the body convey an

* See above, p. 150. † See *l. c.*

influence inwards which produces sensation and gives rise to an outwardly proceeding influence passing to the muscles, and resulting in definite appropriate motions. The influence inwards appears to travel upwards through the spinal cord to the brain, which is ordinarily the organ of both sensation and motion, and so produces feeling, while the influence outwards appears to travel downwards from the brain, through the spinal cord to the muscles, so producing motion. When the spinal cord is divided, it is no longer possible for these influences to ascend to the brain (and, therefore, there is no feeling), or to descend from the brain (and, therefore, there is no voluntary motion). But the unfelt influence travelling inwards is supposed, on reaching the spinal cord, to be thence automatically *reflected* outwards—as evidenced by the appropriate, responsive, but unfelt movements just described. These actions are therefore said to be "reflex."* But the action of the stimulus applied is evidently not the *cause* of the action which results, but only its *occasion*. The force emitted by the organism is due to powers and energies latent within it, which this stimulus makes active and manifest. There is thus an evident spontaneity even in reflex action, though it is nothing to that which our higher faculties make known to us.

But reflex action may take place in the uninjured condition, as during sleep, or under the influence of chloroform, etc. Thus a medical friend of ours while removing the finger of a lady who was under the influence of an anæsthetic, heard her exclaim several times, "Oh, my poor finger!" Yet on recovering consciousness she had not, at first, the slightest knowledge that the operation had been performed.

Actions may occur which are so far analogous to reflex action that they take place independently of, or against, the will though they are accompanied by sensations. Thus if an object not too large be placed very far back in the mouth, it must be swallowed; and, as before observed,† the movements of respiration, though they can be for a time voluntarily suspended, cannot be long so interrupted,

* See also below, chap. xxiii. † See above, p. 155.

but will take place in spite of the will, and automatically. Such actions are distinguished by the term *sensori-motor.* Certain other actions may take place in an automatic manner, as a consequence of sensations experienced. We refer to those which are commonly called instinctive, and which will be briefly noticed at the end of this chapter.*

Different parts of the brain are variously connected with different movements and different sensations; but, for our purpose, these need not here be particularized.

A few words, however, must be said with respect to a network of delicate nerves, which go to such organs as the heart, arteries, intestines, liver, kidneys, generative organs, etc., and which are spoken of as the "sympathetic system." Normally their activities do not give rise to sensation, though in unhealthy conditions pain may accompany them. Amongst these nerves are to be found numerous small, rounded masses of nervous tissue, termed "ganglia," which both receive and give forth nerve fibres. It is in the highest degree probable that these ganglia act with the nerves in a mode analogous to the reflex action of the spinal cord. It is the presence of such a system of gangliated nerves in the substance of the heart which is supposed to give to that organ its power of persistent contraction and expansion—actions which will take place for a brief period even after its sudden removal from the body. Both secretion and nutrition are largely influenced through the sympathetic nerves which extend along the arteries and regulate their contraction or expansion, and so the amount of blood supplied to each part by them.

Thus, as before said, the nervous system is the great co-ordinating system of the body which harmonizes and regulates its activities generally. Nevertheless, the action of the nervous system itself requires to be regulated and to be adjusted to the actions of the other systems; yet it cannot regulate itself. Moreover, those properties and powers of motion, nutrition, circulation, chemical change, respiration, and secretion, which we have found to be possessed by the ultimate protoplasmic particles of the body's parenchyma, must be independent of the nervous system, since

* See below, p. 175.

they are too minute to be supplied with nerves. In the process of development again, as we shall see, the germ of the body is at first devoid of nervous tissue, and its primary orderly changes cannot, therefore, be due to regulating and co-ordinating nervous action. There is thus no one point whence all the activities of the body proceed. There are minute nervous structures, injury to which will stop the movements of respiration, and so cause death very quickly There are multitudes of organs and parts of organs indispensable for the life of the whole, but there is no one organ or part of an organ which can be said to be the organ of the whole body's life. It is the whole body itself which is the organ of the individual's life.

Moreover, our body has, within limits, a power of adapting itself to new conditions, which power cannot be due to the particular arrangement of the nervous system, since that arrangement is constant and universal in all men, while the conditions may be varied and only occasional. Thus if we are compelled to nourish ourselves with some unwonted food, the due action of our digestive organs may be thereby at first impeded. After a little time, however, the evil may diminish, and our organism accommodate itself to its new kind of nutriment. Such activities must be due to a power possessed by the living body of persistently reproducing some tissue change, caused by the reception of the new food, as the change caused by a surface injury may result in a scar which will persist throughout life. This continuous reproduction of a past affection of the organism may be figuratively termed "*organic reminiscence.*" Again, the activities of our body will respond to other impressions in an orderly, appropriate, but unfelt manner. We may observe this in the oarsman's hand, the blacksmith's arm, and the ballet-dancer's leg. Such activities may be spoken of as an "*organic correspondence,*" or "*adaptation.*" It is notorious also that "practice makes perfect." As to injuries, an old man may bear on his leg the mark of a kick received when a boy at school, this mark having been constantly reproduced, for all that the tissues of his body may have been again and again renewed in the course of a long life. But processes of repair and healing take place more readily

Repair of injuries.

in the earlier stages of existence, though sometimes they are very wonderful in adults. Thus after a wound, a perfectly structureless fluid substance may be secreted and poured forth from the parts about the wound. In this substance cells will arise and become abundant, so that the substance, at first structureless, becomes what is called "cellular tissue." Then, by degrees, this structure transforms itself into vessels, tendons, nerves, bone, and membrane—into some or all of such parts—according to the circumstances of the case. When a bone is broken its two broken edges soften, the sharp edges thus disappearing; then a soft substance is secreted, and this becomes at first jelly-like, then gristle-like, and at last bony. But not only do these different kinds of substance—these distinct tissues—thus arise and develop themselves in this at first neutral substance, but very complex structures, appropriately formed and nicely adjusted for the performance of complex functions, may also be developed. We see this in the production of admirably formed joints which are altogether new. Thus, a railway guard met with so serious an accident that he was compelled to have his elbow, including the elbow-joint, cut out. Yet a new joint was afterwards formed almost as good as the old one. Now, the arm contains one long bone —the humerus—above the elbow-joint; but there are two, side by side, below it. The outer of these two bones, the radius, ends above in a smooth-surfaced cup, which plays against part of the lower end of the humerus, while below the elbow, its side plays against the other bone—the ulna—a cartilaginous surface being in each case interposed. The radius and ulna are naturally united to the humerus by dense and strong membranes, or ligaments, which pass between it and them anteriorly, posteriorly, and laterally, and are attached to bony prominences which project from either side of the lower end of the humerus. Such was the condition of the parts when the operation referred to took place. Nine years after it the patient died, and the arm was examined, which in the mean time had served the poor man perfectly well, he having been in the habit of swinging himself by it from one carriage to another, while the train was in motion, quite as easily and securely as

with the other arm. It was found that the radius had formed a fresh polished surface, and played once more both on the humerus and the ulna, a cartilage-like material being interposed. The ends of the two lower bones were again locked in between new processes of the humerus, and bound to it by freshly formed lateral, anterior, and posterior ligaments.* It would be easy to bring forward a number of more or less similar cases.

Developments.

These processes of growth take place in perfect unconsciousness, and the will has no direct control over them. Yet they are directed to a useful end, and are carried on by vital processes which are practically full of purpose and intention, though their end is altogether unforeseen, because quite unknown, to the patient who benefits by them. The study of the mode in which lost parts are reproduced naturally lead us to the consideration of the process of reproduction, or development, of the whole body. This latter development is brought about by changes and processes of growth which are most utterly unconscious, while they are as full of purpose, and as entirely directed to a predetermined, though unforeseen, end, as it is possible for any bodily changes to be. No one can for a moment pretend that the developing embryo knows the processes of growth by which it is formed, or directs them by any effort of its will.

By the "development" of the individual man, is signified the sum of those rapidly succeeding changes of form which commence the life-history of every human being. It should, indeed, properly mean the entire sum of changes undergone from the junction of the sexual elements till the complete maturity of the thence resulting organism. Practically, however, the term has come to mean (as above said) that early part of the process which takes place up to, and shortly after, birth. Thenceforward the changes which ensue are less changes in the forms and relations of parts of the body than in their dimensions, and such later part of the process of development is generally spoken of as "growth."

* See Mr. Timothy Holmes's "System of Surgery," 3rd edit., vol. iii. p. 746.

The first germ of the future human body appears in the shape of a minute rounded mass of protoplasm, from which, by degrees, all the varied tissues and all the complex parts which constitute the adult man are derived—and thus every tissue of every kind is formed or "secreted" by protoplasm. This simple protoplasmic particle, or cell, divides and subdivides itself again and again, till three layers of cells are gradually but rapidly formed. Thus there is a close analogy between that process of growth which constitutes the development of the individual, and the growth (as before explained) of the several tissues of the body.

Soon a groove appears on the surface of the embryo, wherein is laid the foundation of the brain and spinal cord, and, beneath the latter, that of the backbone. Then, after certain other foldings, a heart shows itself and beats, and blood is formed and circulates. Limbs also grow forth, and jaws and sense-organs form themselves and, little by little, the at first shapeless mass, more and more approximates to the human form. But the body is only built up in a very roundabout way. Its earlier structural arrangements are very different from those of the adult man. The brain, at first, is not a minute model of the future brain, for all that is most conspicuous in the adult brain is not represented in it. The heart also is primitively even more different from that of the full-grown man in form than it is in size. It is a simple tube, which subsequently becomes bent on itself and subdivided into chambers, which, nevertheless, are not like those of the adult. Similarly the blood-vessels which go to and from it are at first very different from the full-grown man's in the course they take. These arteries at first simply arch up on either side of the throat and meet together dorsally to form the great artery of the body—the aorta. The lungs, of course, are functionless till birth changes the embryo breathing through the blood of its mother, into the infant breathing by its own aerial respiration. The first kidneys are not those of adult life, in which they persist but as minute functionless rudiments. There is also, to begin with, a long tail; but this does not continue to grow as do the adjacent

parts, and so it becomes entirely hidden beneath the skin. The limbs are of very different relative lengths at different periods of the process of development, and the great toe, before birth, stands out widely from the others. Certain clefts—termed visceral clefts—also exist for a time on either side of the throat, and between them are solid structures called "visceral arches," along which extend those arteries which have been already said to arch up on either side of the throat. The sex of the embryo is at first indistinguishable, while the organs of generation of both sexes at first appear alike, and only become different through diversities of growth in the two sexes. The skeleton is primarily represented by membranes, afterwards by these and by cartilages, and only finally by bones. Instead of the series of bones, each of which is called a "vertebra,"* and which make up the back-bone, there is at first only a continuous gelatinous rod, called the "notochord," or "*chorda dorsalis*." The bones are at first much more numerous than those which are found distinct later in life, as they grow together in various ways and at different rates, in different parts, as life advances. Finally, before birth, the whole body is clothed with a delicate coat of hair, called the "lanugo," which subsequently falls off.

Heredity and variation.

It is a notorious fact that children resemble their parents. It is not, however, their parents alone whose form, disposition, or tendencies to disease are reproduced. Occasionally some characteristic of a grandparent, or more remote ancestor, or even of some collateral relative, will reappear. The transmission of parental characteristics is called "heredity," and is evidently a property not of the offspring, but of the parents who transmit their likeness. It may be considered the primary or fundamental law of development.

But every man has had both a father and a mother, and comes of a line of ancestors, every one of whom was in the very same case. This fact modifies the great law of heredity, so far as to produce a more or less complex compound of hereditary tendencies, varying according to (1) the amount of force springing from each ancestral

* See above, p. 152.

strain, and (2) the compatibility or incompatibility of the prevailing tendencies—resulting in an intensification, perpetuation, modification, or neutralization of ancestral characters, as the case may be. All such action is but "heredity," acting in one or other mode; nevertheless it results in what are practically "variations" of offspring from the parent form. The reproduction of ancestral characters, as distinguished from parental, is termed "atavism." But another and fundamentally different kind of action from that of either heredity or atavism also causes variation. Such are changes in the surrounding circumstances of parents or of the embryo during its development, which may result in variations of form that may be inherited. Thus certain affections of the skin, or of the nervous system, or of the generative organs, or of the hands and feet (supernumerary fingers and toes), are very apt to be inherited. Amongst variations of the generative organs, an entire absence of the uterus, or womb, is sometimes inherited, and this is especially interesting, because such a variation can only be propagated indirectly.

Habit. There is another bodily activity we possess about which a word or two should here be said. It is related to that power of ours whereby actions are performed, that have been already distinguished * as "analogous to reflex action." This is the power we have of forming habits, which is itself the sign of our possession of a special internal spontaneity by which our organism tends, within limits, to "react" when acted on. For what is a "habit"? A "habit" is not formed by repeated actions, though it may be strengthened and confirmed by them. If an act performed once only † had not in it some power of generating a "habit," then a thousand repetitions of that act would not generate it. Habit is the determination in one direction of a previously vague tendency to action. We have a natural tendency to activity. Action is not only natural to us, it is a positive want. Our powers and energies also tend to increase with activity and exercise (up to a certain limit), while they diminish, and finally

* See above, p. 167. † See further below, chap. xxiii.

perish, through a too prolonged repose. Thus a power of generating "habit" lies hid in all, and in the very first of those actions which facilitate and increase the general activity and power of our body, and facilitate and increase the exercise of that power in definite modes and directions.

Instinctive actions.

This tendency to bodily activity which underlies "habit," naturally leads us on to consider the kind of action we before referred to* as "instinctive." Instinct, as a "feeling," belongs to the next chapter,† but a mention of the bodily movements to which it gives rise must not here be omitted. Instinctive movements differ from reflex actions in that they are not merely responsive to a stimulus felt, but are so responsive to it as to serve a future unforeseen purpose. Such an action is that of the infant which, in response to a feeling produced on its lips, first sucks‡ the nipple, and then swallows the thence extracted nourishment with which its mouth is filled. It is an action necessary for the nutrition and life of the infant; it is also an action done directly after birth, when there has been as yet no time for learning to perform it. It is a definite and precise action, and one performed in a similar manner by all infants, though it is effected by a very complex mechanism, and is performed at once, prior to all experience. But not only sucking and deglutition, but also the movements by which the products of excretion are removed from the body of the infant, are instinctive. In later life, various other instinctive actions minister indirectly or directly to reproduction. It is an instinct which prompts the little girl, with unconscious coquetry, to decorate herself, and not only to fondle her doll, but to press it to that region whence her future offspring will draw its nourishment. Later on, when come the days of love and courtship, instinct leads youths and maidens to seek each other's society, and tends naturally to induce affectionate feelings and ultimately caresses, each of which acts as a further stimulus, ultimately leading on towards actions indispensable to the race.

* See above, p. 168. † See below, p. 184.

‡ As to this, the celebrated anatomist, Bichat, says, "It is instinct, which I do not understand, and of which I can give no account, which makes the infant, at the time of birth, draw together its lips to commence the action of sucking."

Death and life.

During the earlier stages of life the vital activities which build up the body are manifestly in excess. Life ever reacts upon obstacles and increases in vigour from the need, which obstacles create, for increased activity on the part of the organism. During middle life there is, roughly speaking, a balance between the reparative and the destructive processes; but as age advances, the processes of repair relatively and absolutely decrease, and life is maintained in a more and more unstable equilibrium, till the fatal end inevitably arrives, and death reduces what was an "organism" (all the parts of which were reciprocally ends and means) to a mass of organic matter of different kinds, devoid of that intrinsic activity which pertained to it through the whole of life. Normally, however, life does not cease with the individual, but persists in that individual's offspring. Generative activity accompanies the period of life's greatest vigour, and but a relatively feeble vitality characterises, as a rule, those declining years which remain to us after the processes of reproduction have come finally to an end.

Hierarchy of functions.

During healthy life the actions of the various cells, tissues, organs, and systems of organs of the body, constitute a hierarchy of activities which results in the supreme activity which each of us knows as his own life. The "cells" which constitute each several tissue of the body, though they have a sort of life of their own, yet have their quasi individual lives merged, as it were, in the life and activity of the tissue of which they form a part—just as the various activities of the different minute fragments or varieties of protoplasm which form a "cell" are merged in the life of that cell. In the same way the properties of the various tissues are merged in the function of the organ of which they form a part. The stomach digests food, and does it by means of the properties of its component tissues, but it is the stomach as a whole which carries on the function of such digestion, part of which is due to muscular action (the contraction of the muscular fibres in its walls), and part to solution. So, also, the functions of each separate organ are merged in a higher unity, namely, the function of the system of organs whereof they form a

part. Thus the retina at the back of the eye has its own activity, but it can only exercise it usefully, in conjunction with the humours and structures in front of the retina; nor can all these together effect sight, without the brain; nor will even this conjunction suffice, except when a due supply of vivifying blood circulates through the whole. The heart, again, is the main organ of circulation; yet circulation is not a function of the heart apart from the vessels, but of it and all the vessels likewise. In a similar way the functions of all the systems of organs which together compose the body, unite and merge into a higher unity of activity—the life of the whole body. This "life" is the function of man's body considered as one whole, just as the subordinate functions are those of the body's several sets of organs.

Having thus briefly passed in review our essentially bodily activities—those known to us by external observation—we must next proceed to consider those other bodily activities with which we are made acquainted by consciousness,—through introspection—and, ultimately, those higher mental powers with which the activities of the body seem to be least concerned.

CHAPTER XIV.

OUR LOWER MENTAL POWERS.

We have a multitude of mere feelings severally related to the various orders of our intellectual perceptions, emotions, and volitions. These sensitive faculties, which are of the greatest practical importance to life, exist beside the intellect, and not unfrequently practically supply its place in simple matters when intellect is permanently or temporarily absent.

A recapitulation—Two orders of mental powers—Pleasure and pain—Definite sensations—Consentience—Instinctive feelings—Mental images — Their association — Emotions — Sensuous memory — Knowledge and sensuous knowledge—Feelings of activity, passivity, power, self, not-self, and difference—Sensuous generalized cognitions—Feelings relating to succession, extension, position, shape, size, number, and motion—Feelings relating to surprise, doubt, agreement and disagreement, and of pleasurable satisfaction from conduct—Sensuous inference and feeling of causation—Appetites and desires—Tendency to imitation—Emotional language—Feeling for beauty—Co-ordinate feelings—Organic volition—Sensuous attention—Feelings of means and end.

THE full significance of this chapter will probably not be obvious to the reader at first. Its great importance and the utility of its contents will, however, appear more plainly in the fifth section of this work—that on science. In the mean time the student of truth is earnestly entreated to pay particular attention to its contents, for we believe the distinctions it treats of are amongst the most important and the least noted in the whole study of the mind.

A recapitulation.

In the foregoing chapter it has been shown that we have three kinds of bodily activities: (1) those accompanied by feeling and consciousness; (2) those which can never be

mentally perceived by us; and (3) those which may be accompanied by sensation and consciousness at one time and not at another. Thus the intimate processes of growth, reproduction, and development, can never be felt, and we can never be conscious of them. Even the details of our voluntary motions are generally imperceptible to us. Yet, of course, we know full well when our body performs those actions which we expressly desire it to perform. Certain vital processes (such, *e.g.*, as the act of breathing) usually pass unnoticed, but can be observed and attended to at will; others, again (like the beating of the heart and the contractions of the intestine), go on normally without being felt, but, under certain circumstances, may be felt distinctly and even painfully.

We have also seen that most important vital processes —the ultimate processes of assimilation, respiration, and secretion—take place beyond the direct and immediate action of the nervous system on the minute parts which perform them; as, of course, does the first formation, in the embryo, of the nervous system itself. We have also noted that though feeling is a main function of the nervous system, the same system, nevertheless, ministers both to motion and secretion, and also plays its intermediate part in bringing about those intimate life-processes before mentioned, which are not felt. Thus the alimentary movements and those of the heart, though normally unfelt, depend on the integrity of those parts of the nervous system which are distributed to them.

We have further noted how the nervous system may act in a reflex manner* and, without the accompaniment of any sensations, give rise to appropriate co-ordinated bodily movements, just like those which would naturally result from sensations.

Finally, we have seen how the occurrence of certain sensations (such as those produced by a small object very far back in the mouth) may give rise to motions (such as those of the action of swallowing) which, though felt and perceived, are utterly beyond the power of the will to control.

* See above, p. 166.

There is thus a gradual transition in us from vital processes performed altogether without the intervention of the nervous system, through unfelt nervous acts, to acts distinctly felt and voluntarily performed by the help and intervention of the nervous system.

Thus, as before pointed out,* we have, besides our intellectual faculty and our sensitivity, also an unconscious vital power by which life is mainly sustained, and by which vital processes take place on the receipt of impressions which remain unfelt and unknown to consciousness at the time they occur.

Two orders of mental powers.

Turning now our mental eye inwards and considering our experiences by a process of introspection, we may note, in the first place, the elementary fact that we do experience "sensations" of different kinds, and that we have also "perceptions" which are very different from "sensations." Indeed, we saw in the last section† that "sensations," *i.e.* "feelings," are the means and not the object of perception—unless, of course, our intellectual activity be directed to them and so make them the objects of our attention. Thus it is plain that there are two kinds of mental activity —one typified by these, ordinarily disregarded, "feelings" just referred to; the other typified by the intellectual perceptions to which they minister.

A great number of very different mental processes naturally group themselves about one or other of these two activities—"feeling" and "perception." Thus all the acts of our mental activity can be arranged in two great groups, which may be distinguished respectively as our "higher" and "lower" mental faculties. For no one can question the higher and nobler quality of a process of reasoning, or of a perception of moral merit or of demerit, compared with mere feelings of sourness or sweetness, warmth or cold, hunger or repletion.

Now, distinct, conscious, intellectual activity accompanies all those mental acts by which we examine anything with attention, and therefore those acts by which we examine our mental acts themselves. Nevertheless, we have, through memory, the power of looking back and

* See above, p. 94. † See above, p. 90.

recognizing that some of our mental acts have not been so accompanied. Thus we every now and then recollect something we have recently seen or heard, but which we were not conscious of at the time we saw or heard it, and we constantly remember to have seen some object, and therefore know we must have had the sensations necessary to that perception, though we cannot even by any effort recollect the sensations themselves, which we thus know we must have felt. Such unconscious acts are amongst those we reckon as belonging to the lower category of our mental powers, and we shall meet with other examples of the kind when we come to consider the lower forms of memory and knowledge.

Pleasure and pain.

Accompanying the exercise of our mental faculties of both the higher and the lower kinds, we may have either a feeling of pleasure or of pain; or we may be, so far as we can determine, in a neutral condition, and not distinctly feel either the one or the other. These pleasures and pains may be very different in kind and degree. The pleasure experienced on solving an intricate problem, or the pain attending the discovery of the unfaithfulness of a beloved friend, are different enough from the pleasure felt in drinking an agreeably flavoured wine, or the pain of a burn. It is to the pleasures and pains of the lower order to which we would now advert—pleasures of the senses, of exercise after prolonged repose, of agreeable imaginations and emotions, and those attained in the gratification of the passions and desires. Now, unless diverted by some special cause, we have each of us not only such pleasurable and painful feelings, but we have an innate, twofold tendency in their regard. On the one hand, this spontaneous tendency inclines us to pursue, persist in, or plunge deeper into whatever is pleasurable, and on the other, to avoid whatever is painful.

What we here especially desire to call attention to is the fact, not that we consciously and deliberately pursue pleasure and avoid pain—for very often we do nothing of the kind, and sometimes we consciously do the very reverse —but that we have an unconscious, spontaneous tendency so to do, and that we automatically and instinctively act

in this way when we do not advert to what we are about, unless by so doing we act against any habit we may have previously formed.

Definite sensations.

It is one of the elementary facts of our mental life that we have feelings of very different kinds—some of them so distinct that we are unable even to conceive of any gradual transition between them. Thus all but the blind and the deaf, know how distinct is a sensation of colour from one of sound. We cannot even conceive of a sensation intermediate between blue and a given musical tone, or between the smell of musk and the feeling of hot iron. It is true that a blind man is said to have declared that he compared scarlet (which he had never seen) to the sound of a trumpet. But this may have been due to an association of ideas between the red coats of English soldiers and the military musical instrument. Anyhow, he did not pretend that he could conceive of anything intermediate between colour and sound, but only of an analogy between two sensations of different orders. These definite sensations are due to our organization. The eye translates all stimuli applied to it in terms of light—as a blow is said to make the eye "flash fire." Similarly the auditory nerve, however stimulated, makes but one response—sensations of sound—and the same is true of the other organs of special sense. Obviously, for all we know, we might, had we additional sense organs, become acquainted with other properties of bodies now unknown to us. Our sense-knowledge is also conditioned by our organs, and limited to what they can tell us. Besides special sensations of colours, sounds, smells, tastes, and those we call feelings of contact, or of heat and cold, we have a great variety of sensations due to the different characters of the surfaces of objects—smooth, rough, soft, hard, etc. We have a variety of feelings of pressure (active and passive) and others due to effort and the relative positions of parts of our body, as in grasping objects of different sizes or weights, or at different distances; objects either at rest, or slowly, quickly, feebly, or powerfully in motion. All these various feelings, moreover, can not only be so felt as to be consciously perceived, but also, as before observed,

may occasion unnoticed feelings, and so give rise to corresponding actions without our being conscious of them, as will shortly be more fully pointed out.

Consentience.

Now, the unfelt influences, before adverted to, which bring about our reflex actions and those unconsciously felt sensations which produce involuntary responsive actions, instinctive or otherwise, all agree in this—that they affect our bodily organism; and all those that are felt affect our sensitivity. Whether they are feelings of colour, light, darkness, loud or gentle sounds, pungent odours, heat, cold, contact, or what not, they must be received by one common ultimate sensorium, or they would not produce the effects they do. A sudden half-blinding light, a sudden half-deafening sound, a sudden sensation of burning, will all produce a similar result in the form of an involuntary start. And when we interrogate our own experience, we find that all our varied sensations, as we consciously know them, do meet, as it were, in our being, and all become so many modifications of our consciousness. As, however, these sensations may (as we have seen already, and shall see more clearly later)* be felt without consciousness, we require a term to express the faculty we have of receiving them all, in one unity of our being (one sensorium) apart from consciousness. The best term to denote this faculty, seems to be "consentience." When our mind is entirely directed upon some external object, or when we are almost in a state of somnolent unconsciousness, we have but a vague feeling of our existence—a feeling resulting from the unobserved synthesis of our sensations of all orders and degrees. Such unintellectual sense of "self" is a form of "consentience." It is by this faculty of "consentience" that the unconscious sleep-walker receives and accurately responds to the varied impressions which surrounding objects make upon his organs. It is by the same faculty, again, that the idiot makes such responses as he can make to similar impressions; and this shows us how (by the help of his rational fellow-creatures) a man may for years unconsciously receive sensations and so unite them, as to be able to continuously respond to them

* See below, p. 187.

without ever having had one scintilla of self-conscious intellect.

Instinctive feelings.

Instinctive actions have already been referred to.* Of the feelings which accompany such actions we are either altogether unconscious, or they exist independently of consciousness, with which they can entirely dispense. Thus the action of the infant when it first sucks the nipple and swallows the nutriment thence extracted, must be done unconsciously, and has no more been learned, than it is performed by the infant with a deliberate intention to nourish its body. The feeling of instinct is more than a want, and less than a desire. It is a certain felt, but not perceived (felt by "consentience," but not perceived by "consciousness"),† internal stimulus to definite actions, which stimulus has its foundation in a certain feeling of want, but is not a definite feeling of want of the particular end to be attained. Were that recognized, it would not be "instinct," but "desire." It is but a vague craving, or a mere tendency, to exercise certain activities on the occurrence of certain sensations, which activities conduce to useful but unforeseen ends. Instinctive feeling often sets in action organs quite different from those which feel the prick of want, and which do not (experience apart) seem to have relation with it. The feeling of hunger does not stimulate to action the organs of digestion which suffer from it, but excites the limbs and jaws to perform acts by which food may be obtained and eaten. The infant's first act of sucking is not only due to sensation, but consentience accompanies it. It is not, therefore, a mere reflex act. The instinctive feelings which minister to reproduction are most remarkable and powerful. They constitute a rigorously determined and precise want, partly painful, partly pleasurable. If any one would deny that the actions they lead to are instinctive and independent of the conscious intellect, let him study the sad phenomena connected therewith which may be observed in our asylums for the idiotic and insane. The first *active* exercises of the senses of seeing, hearing, smelling, tasting,

* See above, p. 175. As to instinct in animals, see below, chap. xxiii.

† This distinction will appear more clearly in chap. xv., "Consciousness."

and feeling (the first "looking," the first "listening," etc.) which the child performs at the very beginning of its learning to perform them, may also be regarded as "instinctive."

Mental images.

It is a notorious fact, and the experience of the reader will at once assure him of its truth, that "feelings" which have been experienced may again recur in what we call the "imagination." Mental images (or "phantasmata," as they were called of old) are faint reproductions of before felt sensations and groups of sensations, and we cannot doubt but that some, at least, of those parts of the nervous system which are strongly stimulated in experiencing actual sensation, are also faintly (or it may be, strongly) re-excited during the imagination of such sensation. Here, again, we have abundant evidence that mental powers of this kind can and do exist apart from the action of our conscious intellect. How common is the experience of melodies which seem to haunt us, and not only rise unbidden, but cannot easily be got rid of; and the same thing occurs with the mental reappearance of harrowing, or dispiriting, or very fascinating objects we may have witnessed.

Their association.

In the opening of the first chapter of this work it was pointed out * that feelings which have been experienced by us successively, come to be associated together. We also naturally associate imaginations one with another, and imaginations with sensations, and both of these with emotions. It is very important, for our present purpose, to note this power which we have of associating together feelings (sensations) and imaginations in groups, and in groups of groups, so that when one or more of the feelings associated in the imagination is again freshly experienced, all the feelings which have been associated with it in the past tend to be aroused also. Examples of the exercise of these powers of association and consequent revival often occur. Thus the sound of a dinner-bell, or the sight of an expanded umbrella, may instantly arouse in our minds associated images of food or of rain. It is not only that we intellectually know that the bell may be a call to

* See above, p. 6.

dinner, or that the umbrella is probably expanded on account of rain, but associated images may arise *before* the thoughts with which they are connected, and such images may persist for a time in spite of our efforts to expel them. On hearing, after perhaps an interval of many years, the notes of some melody familiar in early days, images may be aroused which will kindle long dormant emotions. The old man may momentarily become, in imagination, a youth once more, and seem to feel his half-paralyzed limbs again treading the rhythmical measures of the waltz, and his feeble arm supporting a form dear to memory. Even so simple a sensation as that of some odour will often recall a whole train of vivid images which have been therewith associated in the past. These complex associations of feelings, accompanied with more or less pleasure or pain, constitute the emotions of our lower mental nature. Such lower emotions may be aroused in us apart from the exercise of our reason. Thus the emotion of fear may sometimes be suddenly excited before there is time for any speculation about, or comprehension of, the cause which has excited it. Emotions connected with hunger and the instinctive feelings relating to reproduction, may be aroused unconsciously and may exist in idiots. Other sensuous emotions are, feelings of sympathy and companionship—apart from the intellectual recognition of the existence of claims on our sympathy, or of the presence of others with us. We may also note the feeling aroused by evidences of hostility or disapproval on the part of our fellows, and the peculiarly painful and regretful feeling of "shame" following upon our sense of having done something likely to call forth such hostility or disapproval. I refer here only to the feelings which may follow such actions, and not at all to any intellectual judgment we may make concerning them.

Emotions.

Sensuous memory.

In our chapter on memory we observed* that no repetition of a feeling constitutes an act of memory unless we are conscious of it not only as existing, but as relating to the past. But the facts of unconscious imagination and association show manifestly that we have, neverthe-

* See above, pp. 31, 32.

less, a certain power of retention with respect to sensations and emotions, and a power through which we can not only preserve, but re-excite them. This retentive faculty lies at the base of our wonderful powers of recollection and reminiscence,* but is something radically different, and exists apart from consciousness. Nevertheless it may, by analogy, be distinguished as "sensuous memory," or the "memory of the imagination." It is by the help of this faculty that we perform unconsciously a multitude of familiar actions—as introspection shows us. Of course, whenever we think, we are necessarily conscious; but, nevertheless, memory enables us to detect the past existence in us of sensuous memory based not upon consciousness but consentience. Thus we may detect ourselves as having performed such acts as the following, and as, therefore, having unconsciously possessed and exercised in doing them that unconscious memory of the imagination without which they could never have been done: We may find, for example, that we set out on a walk to some place in a distant part of the city, and on the way became immersed in speculations about business or politics, so that the sounds and sights about us were either lost to consciousness or only aroused it feebly and instantaneously. We were what is called "lost in thought." Yet we did not miss our way along the familiar road; each turning, each crossing, was accurately effected, and it may be we were only roused from our reverie by the sight of the place we set out to reach. Here, then, although we had no conscious memory or reminiscence of the several objects which passed before our eyes in reverie, yet we must have had an unconscious or sensuous memory of the imagination concerning them, or they could not have served to rightly guide us along our path. Again, let us suppose the case of a lady playing with perfect facility on the piano a difficult piece of music, which it has cost her much labour and attention to learn. While she is playing it, she talks to a gentleman who she thinks will very likely make her an offer. Her consciousness is absorbed in attending to his words, his tone and manner, with mental

* As to this distinction, see above, p. 31.

side-glances as to fortune, temper, and other matters. Yet she may never falter in her playing, nor in the long-practised delicate distinctions as to the force and prolongation of pressure with which the different keys should be struck. But her consciousness all the while may be so far from being directed to the actions of her fingers that, were she so to direct it, the probability is that her execution would be thereby impaired. Almost every one who plays the piano knows how often a melody once learned, but now in part forgotten, can be best recalled by studiously turning the mind away from what is being done, while an effort is made to play it automatically. In other words, the melody is recalled by avoiding the use of intellectual memory, and by trusting entirely to that sensuous memory, which has become, as it were, embodied in the nerves and muscles—the retentive memory of the imagination. In a certain vague and improper sense we may be said, having learned to do such things, to "recollect" how to do them; but unless the mind recognizes the past in the present while performing them, they are not instances of intellectual memory, but merely instances of that retentive faculty which we have distinguished as sensuous memory.

Knowledge and sensuous knowledge.

By the aid of sensuous memory and the power of associating the retained impressions, or images, of past sensations and imaginations, united in groups and groups of groups, we come to possess a power recognizing objects and practically knowing them in a merely sensuous way, apart from a real intellectual knowledge of them. Here, again, being the rational animals we are, we cannot know them except intellectually when we think about them. We cannot, of course, so know them except consciously. But memory enables us to recognize the fact that we must have occasionally known objects in the past in a merely sensuous manner; and since everything must be a possible thing which has actually occurred, we may be sure we *can* have merely sensuous knowledge since we may thus assure ourselves that we *have* had it. Now, in the instances before given of the piano-playing and the walk into the city, the notes of the instrument and the places traversed in the walk must have been practically recognized, and

therefore known in a certain sense, or they could not have been made use of as supposed.

In fact, great ambiguity exists as to the use of the word "know." Just as before with the term "memory," so also here, certain distinctions must be drawn if we would think coherently.

(*a*) To "know," in the highest sense which we give to the word, is to be aware (by a reflex act) that we really have a certain given perception. It is a voluntary, intelligent, fully self-conscious act, parallel to that kind of memory which was before distinguished* as "recollection" and contrasted with "reminiscence."

(*b*) We also say we "know" when we do not perform a reflex act, but yet have a true intellectual perception—a perception accompanied by consciousness—as in most of our ordinary intellectual acts, *e.g.* in giving orders, or learning, or teaching, or pointing out any facts.

(*c*) But when we so "know" a thing that it can be done unconsciously, we cannot be said to "know" it intellectually, although in doing that thing the nervous and motor mechanism of our body acts (in response to the stimulus of sensations) as perfectly as, or even more perfectly than, in our fully conscious actions. The "knowledge" which accompanies such "unconscious action" is improperly so called, except in so far as we may be able to direct our minds to its perception, and so render it worthy of the name—just as we may direct our attention to acts of sensuous memory, so as to make them conscious acts. In the same way, then, in which we have already distinguished from acts of true memory, those unconscious reminiscences we have termed acts of sensuous memory, so we may distinguish from true intellectual cognition that power of unconscious apprehension which may by analogy be termed "sensuous cognition;" and as we have a true *intellectual perception* of objects, so also we may have merely a sensuous perception of them, which may also be called a "*sense-perception.*"

Feelings of activity, passivity, power, self, not-self, and difference.

Amongst our various feelings there are two which are of constant occurrence and have great significance. When-

* See above, p. 31.

ever we act, we have a certain vague feeling of our *self-activity* and exertion of power or force, and when we are acted on, a feeling of *passivity*. These feelings are quite apart from the intellectual consciousness we have of our existence, and of the action of bodies on us. Thus we may be walking (as before supposed), so deeply immersed in thought as to be quite unconscious of our movements. Let this be the case, and then let the wind (blowing in the same direction as that in which we are walking) so increase as to make us go on faster than we were spontaneously going. We shall thus come to have a feeling—"force exercised upon us"—of being acted on by a power external to us; a feeling different from that which corresponded with our activity acting alone and without the external propulsion. Thus it is plain that we can have not only a feeling of our activity, and another of our passivity, but also a feeling corresponding with the difference between these states, apart from our intellectual recognition of that difference.* So, again, in feeling one hand with the other, we have a double feeling of self-activity, and a double feeling of resistance and passivity, and in each hand we have combined feelings of both activity and passivity, and the passivity of the one is felt in correspondence with the self-activity of the other. Thus, by the aid of consentience and without consciousness, we may have a distinct feeling or sense of self—apart from an intellectual perception of it—and also a feeling or sense of "otherness," or "not-self," with respect to things external to us. Thus, if we consider the mere feelings which accompany the action of drawing our hand over a foreign body, or of grasping that body, we shall find that we have there, again, the combined feelings of activity and passivity in the hand; but its passivity is

* An amusing instance of such feelings, together with strong emotions with much apparent rationality, but without consciousness, is given by the late Dr. Carpenter, in his "Mental Physiology" (1874), p. 605. Speaking of two somnambulists who were being experimented upon when he was present, he tells us, "A violent blow was struck, which chanced to alight upon the second somnambulist; his combativeness being thereby excited, the two closed and began to belabour one another with such energy that they were with difficulty separated. Although their passions were at the moment so strongly excited that, even when separated, they continued to utter furious denunciations against each other, yet a little discreet manipulation of their muscles soon calmed them and put them into perfect good humour."

thus no longer felt (as when it grasped the other hand) in conjunction and correspondence with a feeling of self-activity in the object (here a foreign body) which gives rise to its feeling of passivity. In this case we come to have a feeling of our own action, and a feeling of the action on us of something external to us—that is, a practical, sensuous feeling of self and of other objects, without any intellectual recognition of our own existence, or of the fact that the external objects are objects. In order to have these feelings, it is necessary also to have a certain feeling of *difference;* for feelings can neither be different in kind, or even succeed each other in time, without giving rise to some feeling corresponding with the difference which makes these feelings unlike each other and, in this way, distinguishable and practically contrasted in our sensorium.

Sensuous generalized cognitions.

But as feelings and imaginations become associated through being experienced in succession, so also do sensuous cognitions become associated by their resemblances, so as to give rise to a generalized, sensuous cognition. As before pointed out,* a successive series of slightly different images may generate another mental image of a generalized kind—an image which is different from each of the separate engendering images, though partaking of the nature of all—like those universal photographs, wherein, by the superposition of slightly different images, we actually get such a kind of generalized photograph.† When the sleep-walker or the man in a reverie sees objects in his path which he avoids, we cannot doubt but that he feels them not only as individual objects, but as objects of one or another kind—a door, a step, a curtain, or whatever it may be.

Feelings relating to succession, extension, position, shape, size, number, and motion.

It may be well here next to note certain other feelings which relate to the succession, extension, position, shape, size, number, and motion of objects.

In feeling something in motion (as on feeling the links of a chain drawn across the hand), we have a feeling corresponding with the *succession* of the parts as they pass, and

* See above, pp. 103, 105.

† Such generalized mental images will be spoken of as "sensuous universals" in the next chapter. See below, p. 206.

a feeling of the *termination of the succession*, when the motion has come to an end.

It is the same as regards the serial nature of the feeling we have when we hear a succession of sounds, or see a series of similar objects in a line ; and if there is a physical resemblance between the series of succeeding things, there is a corresponding resemblance between the feelings they induce, and which, of course, also succeed each other in a series. We have no feeling of succession itself. Succession, as apprehended by us, is a purely intellectual apprehension. Nevertheless, we have feelings which correspond with succession, and also feelings which correspond with the termination of any succeeding series of feelings. Similarly, in exploring any solid object with our hands, we have the intellectual perception of its three dimensions—length, breadth, and thickness. But we also have, at the same time, a number of feelings of touch, pressure, the motion of our hand and fingers, etc., and thus we come to have one group of feelings corresponding with the extension of the object felt, together with feelings corresponding with its limits, or the felt terminations of its extension in different directions. In this way we come to have certain bundles or groups of feelings corresponding with the *shapes* of bodies, and also (as by the need of more or less widely extending our arms or fingers to embrace them, or of moving our head or eyes to survey them) other bundles or groups of feelings corresponding with the *magnitudes* of bodies. We have also other groups of feelings corresponding with the *unity* or *multiplicity* of bodies—as when we are affected by a single object (*e.g.* in running against a tree's trunk), or by many objects, as when out in a sharp hailstorm.

By drawing a chain over the hand we may obtain, as has just been said, feelings of succession ; but these feelings are also accompanied by a feeling of its *motion*, as we feel the succession of its points of contact over the breadth of the hand. A very distinct difference of feeling also takes place when this motion is brought to an end, while the chain is still held and felt in the grasp. In this latter case we experience a feeling corresponding with its *rest*, as

distinguished from that corresponding with its motion. The feeling of motion is the feeling most constantly called into play, for it is only by some change—that is, some form of motion—that feelings are excited at all. Thus motion is one of the first of such complex feelings which we experience, and by its very reiteration and the consequent familiarity of our organization with it, it is and must be one of the easiest and most readily felt and imagined throughout life.

These feelings of ours are not ordinarily noticed or attended to by us, because our minds are habitually occupied with the perceptions to which such feelings minister, and not at all with the sensations themselves, which, as before pointed out, are but the means, and not the objects of perception. Nevertheless, a little careful examination of our mental experiences in daily life will soon show that these feelings do exist in us. Their existence amply serves to account for the occurrence, in a state of unconsciousness, of a variety of actions which seem to imply the presence of conscious intellectual apprehensions which we know from the circumstances—as in cases of sleep-walking and reverie—cannot really be present. We have, however, been prepared for such occurrences by the phenomena of reflex action. Single impressions which are not felt may, we have seen, induce responsive reflex actions, like those which would be made if the said impressions were felt. It is not wonderful then that groups of unconsciously experienced feelings should be sometimes able to induce responsive actions, like those which would have resulted, if the groups of feelings in question had aroused consciousness, instead of having merely affected consentience.*

Feelings relating to surprise, doubt, agreement, disagreement, and moral satisfaction.

We experience a certain feeling of *shock* when, upon the occurrence of certain sensations, other sensations, different from those which have become associated with the former, come unexpectedly upon us. Let us suppose we grasp an artificial orange so well made as not only to look like, but to feel like an orange, and that then we cut it open and find its interior very different from what we were thus led to imagine. Thereupon we have,

* As to "consentience," see above, p. 183.

of course, our intellectual perception of the fact, but we also have a certain feeling of shock accompanying our *surprise* on making the discovery. Similarly, if the nature of an object seems to us doubtful, we have a feeling of *suspended action* accompanying our state of intellectual *doubt*. If we find out that the object is in truth what we anticipated it to be, we have, on the instant of finding this out, a feeling, as it were, of *smooth and easy transition* which accompanies our perception of its *agreement* with our anticipations or its *congruity* with them. If, on the other hand, it turns out not to be what we anticipated that it was, then a feeling somewhat like that of *arrested motion* accompanies our perception of its *disagreement*, or its incongruity, with our anticipations. Similarly, when any one behaves to us kindly, we have a *feeling of satisfaction*, and a similar feeling very often attends the performance by ourselves of kindly actions to others. I refer here to the mere vague emotion, or feeling, which attends such actions, not, of course, to any perception of their kindness. This kind of feeling is to be distinguished as a feeling of *pleasurable satisfaction from conduct*, and forms, as it were, the material basis of a higher emotion.*

It thus comes about that, by the exercise, combination, and association of all these different kinds of feelings—by the association of sensations, imaginations, feelings of pleasure and pain, feelings of activity and passivity, and feelings corresponding with the succession, extension, figure, magnitude, unity, multiplicity, motion, and rest of bodies; we come to possess groups of feelings of the most varied kinds, which feelings correspond with the different states of a multitude of external objects which have given rise to them. These groups, and groups of groups of feelings, underlie and accompany our intellectual perceptions of material things, and therefore these groups of feelings may not improperly be termed, as before said,† "sensuous cognitions" or "sense-perceptions."

Sensuous inference and feeling of causation.

The consideration of this power and habit of association amongst feelings which we have now recognized, leads on to yet another consequence worthy of note. When any

* See below, p. 221. † See above, p. 191.

group of sensations has become intimately associated with certain other sensations, then, upon the recurrence of that group, an imagination of the sensations previously associated therewith, spontaneously arises in the mind, and we have an *expectant feeling* of their proximate actual recurrence. Thus the sensation of a vivid flash of lightning has come, by association, to lead to an expectant feeling of the thunder-clap to follow, and the sight of what looks like an orange, may lead, in a thirsty man, to an expectant feeling of sweet juiciness, quite apart from an intellectual recognition of the properties of an orange in the latter case, or of the relation between lightning and thunder, in the former case. This expectant imagination of sensations yet to come, brought about by the presence of a definite group of feelings freshly experienced, has a certain analogy with reasoning or inference, although altogether distinct from it essentially. We may, then, distinguish this kind of feeling as *sensuous inference.* Closely allied to it is that feeling of wondering expectation which sometimes arises—as, for example, when we hear some strange sound or see some unexpected movement—together with the satisfied feeling which ensues when the wondering feeling is calmed through some new experience—as, for example, the sight of some bird which has caused the sound or motion. We refer, of course, to mere feelings which may spontaneously arise, apart from the intellect; and such feelings are the sensuous antecedent or accompaniment, of the intellectual apprehension of causation.*

Appetites and desires.

We have already referred to our emotions, and it can hardly be necessary to point out that we have also feelings of *appetite* and *desire* which exist independently of the intellect, though the intellect can, by reflexion, recognize their existence. That they have this fundamental independence —that, however they may be controlled by reason, they are in no way due to reason—is proved by the fact that even idiots and new-born babes possess them. We do not need intellect in order to feel hungry or that we may make a hearty meal.

Tendency to imitation.

Appetites, emotions, and desires are the agencies which

* As to "causation," see above, p. 48.

set going the greater part of our bodily activity, not distinctly due to the intellect. We have also a curious, active tendency which can hardly be said to be due to any distinct desire or emotion, and this is our tendency to imitation—often so remarkably developed in childhood. Of course, we may be inclined intentionally to imitate, but this is not at all a manifestation of the tendency here referred to. The latter is well exemplified by that spontaneous, automatic yawn which we often find follows when we have seen another person yawn. Such spontaneous and unintentional imitation is often carried much further, notably by some idiots, who will accurately imitate almost any actions which may be performed before them. This tendency may seem at first very surprising. When, however, we reflect that the sight of any movement tends slightly to stimulate those very nerves in the observer which correspond with those by which the action observed has been produced, it becomes easily explicable. For, let this stimulation be sufficiently augmented, and actual movement on the part of the observer almost necessarily follows.

In the same way, manifestations of emotion of any kind on the part of one person, tend to arouse the same emotion in other persons—sometimes giving rise thus to a widespread panic.

Emotional language.

Now, it is an important fact for us to note that our feelings, and especially our emotions, may be expressed by external signs, which are so far from being rational and intentional, that we may be unaware of them, or, if aware of them, unable to suppress them. Thus the emotion of terror shows itself by tremblings of lip and limb, a dropping of the jaw, suppressed breathing, a deadly pallor of the face, and staring eyes. With the emotion of anger, the eyes glare, the hands are often clenched and raised, and the lips compressed or possibly distorted in a fierce grin. Such signs and accompanying cries, produce sympathetic effects on the beholders; who are often, at times of intense excitement, led to respond by similar signs and cries which express feelings instead of, or rather than, ideas; and thus we have a *language of emotion.** This emotional,

* See below, chap. xvi., "Kinds of Language."

unintellectual language may either consist of (1) inarticulate sounds, such as cries of joy, pain, or surprise, or the murmur of a mother to her infant; (2) articulate sounds, such as the talk of certain idiots who will repeat, without understanding, every phrase they hear, or words uttered by rational persons during emotional excitement, without advertence, and without the intention of affirming or denying or asking anything; and (3) gestures which do not answer to rational conceptions, but are merely the manifestations of emotions and feelings. We have but to recollect the articulate sounds which compose the unmeaning oaths so often uttered in every European language, in order to feel quite sure that words may be spoken under strong emotional excitement which denote feelings only, and not intellectual conceptions.

Feeling for beauty.

The sympathy which emotion will beget, may also notoriously be excited by certain appearances and sounds. Persons are often strongly, sometimes overpoweringly, attracted by the aspect of the form or features of other persons, mostly of the opposite sex. Similarly, the charm of the timbre in some human voices is extremely great. These feelings of taste vary greatly in different individuals, and no divergence is more proverbial than that which exists in matters of the kind. Nevertheless, however much the modes of this feeling may differ, it exists more or less in all men, and is so far from being due to our rational nature that our reason may have no direct influence over it.

Co-ordinated feelings.

We have already noticed * those co-ordinations of bodily movement by which we effect spontaneous actions, such as the act of throwing a stone at a mark, which we gave as an example. The different feelings of activity, passivity, etc., which have been described in this chapter, accompany the co-ordinated actions described in the former chapter; and these feelings guide the action of the body as if it were a sort of automatic, sensitive machine.

That such co-ordinated actions may take place through the intervention of merely sensuous influences—apart from the conscious intellect—is made plain by the fact that many idiots and sleep-walkers perform them. Even the

* See above, pp. 156, 157.

most intellectual of mankind may voluntarily set their bodily mechanism going in a certain mode and direction, and then, withdrawing the mind entirely from its actions, leave it to work, as it were, by itself. An example of such action we have already given when we supposed a man walking to his destination "lost in thought." Evidently we may so walk, till we are surprised at finding we have arrived at, or possibly overshot, our destination, and this without having at all thought about our journey while on the road. But the remarkable power which we have of co-ordinating sensations and, through them, co-ordinating motions, is still better exemplified by the, before given, example of the piano-player. In playing "by heart," the actions of the hands follow each other in orderly series in connection with felt touches of the keys and and heard sounds of the notes. Let a key stick or a note be dumb, and the automatic action ceases—through a failure of co-ordination in the associated sensations—and intellectual attention is at once aroused.

Organic volition.

The result of all the foregoing powers of feeling and co-ordination is, that we have an automatic power of co-ordinating and uniting our various pleasurable tendencies into now one and now another *dominant impulse*, quite apart from any act of conscious will. Here, again, the acts of idiots, sleep-walkers, and persons in a state of reverie, will amply bear out our assertion. This power of *synthesizing our various pleasurable tendencies into some dominant impulse* is parallel to that power of similarly synthesizing our movements into one complex general action which was before described.*

Sensuous attention.

One of the plainest and most notorious facts of our mental life is that power which we have of voluntarily directing our attention upon something which solicits our notice. But, apart from this conscious, distinctly intellectual act, an increased energy in the action of our organs of special sense may be excited, altogether apart from our intellect and conscious will. Thus the feeling of "shock," before adverted to,† will of itself lead to the increased application of our senses to an object in quite an automatic

* See above, p. 157. † See above, p. 193.

way. Such a phenomenon has often been observed in a sleep-walker who, missing some object from its wonted place, will begin to look or feel for it. We may also observe in ourselves, when startled by some new and disturbing object, how our senses automatically direct themselves to it without waiting for the bidding of our conscious will. Such action may be conveniently distinguished as "*sensuous* attention."

Feelings of "means" and "end."

Lastly, we have, through the action of associated feelings and co-ordinated motions, the power to spontaneously, but unconsciously and automatically, employ what are practically "means to an end," quite apart from an intellectual recognition of either "means" or "end" as such. This kind of action is brought about mainly by the association of feelings, but partly by that innate tendency to imitation before noticed. It is by the habitual association of feelings that, without a moment's thought, we take the simplest means to obtain ends—such, for example, as the quickening of our pace to overtake a friend walking in front of us, or jumping up a bank to pluck a flower otherwise above our reach. The sight of some simple means employed by their seniors, may lead children, by mere imitation and without reflection, to employ the same means themselves; and such actions may readily become automatically habitual if the result attained is agreeable and capable of frequent repetition. The employment of means for ends, apart from the exercise of the intellect, is sometimes exhibited by somnambulists. Thus, a sleep-walker may open a drawer to take out of it some desired object therein contained, or may turn a key to unlock a door, and so obtain entrance into some locality sought after. Such actions are easily explicable through the habitual associations of sensations with co-ordinated movements. For the sensorium of the sleep-walker has presented to it various groups of sensations, such as those produced by the walls and furniture of the room the sleep-walker is traversing on his way to the desired locality, the door of which is locked. The sensations thus excited arouse his imagination of the inside of the desired locality, this in turn excites the nervous channels habitually stimulated

in overcoming the intervening obstruction ; the hand automatically seeks the key ; the feelings produced by its touch stimulates the muscles of the arm ; the key is turned, and the door opened ! Very complex movements of the kind are sometimes automatically performed in order to *complete a harmony which the imagination craves.* It craves for fresh, completing sensations, and is thus led to perform appropriate movements, when certain initial sensations have been afresh excited, after which the completing sensations have (in past experience) habitually followed. This, then, is the *practical imagination of means to effect a desired end,* without any intellectual apprehension of either end or means. Let a certain set of initial sensations (*a, b, c*) have been habitually followed in past experience by certain other sensations (*l, m, n*), which latter are intimately connected with certain movements (λ, μ, ν). Then upon the actual recurrence of the sensations *a, b, c,* the imagination of the associated sensations *l, m, n,* will give rise to such a craving for the repetition of the latter, that the movements requisite to effect it (namely, λ, μ, ν) will be performed automatically, so as to bring about the repetition craved, and complete the sensational harmony thus vaguely and unconsciously desired.

Such are the wonderful felt and unfelt various vital powers and lower mental powers with which our nature is endowed—powers beside, and more or less apart from, the intellect, for they may be exhibited by persons who are either permanently devoid of intellect, or in whom it is temporarily dormant.

They may be enumerated as follows :—

(1) Powers of growth, repair, and reproduction.

(2) A power of motion.

(3) A power of being impressed by unfelt stimuli.

(4) A power of responding to such impressions by appropriate movements—*reflex action.*

(5) A power of persistently reproducing a modification once induced by the environment—*organic reminiscence.**

(6) A power of correspondence with new conditions—*adaptation.*†

* See above, p. 169.

† See above, *loc. cit.*

(7) A power of *feeling.*

(8) A power of special sensation in appropriate *sense organs.*

(9) A power of synthesizing feelings—*consentience.*

(10) A power of responding automatically to felt stimuli—*excito-motor actions.*

(11) A power of forming *habits.*

(12) A power of performing *instinctive actions.*

(13) A power of experiencing *pleasure and pain.*

(14) A power of *sensuous memory.*

(15) A power of reproducing past feelings, and so forming *phantasmata* or *mental images.*

(16) A power of associating such mental images in groups, and groups of groups—*imagination.*

(17) *Passions and desires.*

(18) *Sensuous emotions.*

(19) A power of associating past feelings, imaginations, and emotions—*sensuous association.*

(20) A power of grouping clusters of present sensations and associating imaginations therewith—*sense perceptions* or *sensuous knowledge,* and *automatic classification.*

(21) A power, with an expectant feeling, of reviving past imaginations on the occurrence of sense perceptions —*organic inference.*

(22) Feelings relating to *causation.*

(23) Feelings of activity and passivity, of self and not-self, and of difference.

(24) Feelings related to succession, extension, position, shape, size, number, and motions.

(25) Feelings relating to surprise, doubt, agreement and disagreement, pleasurable satisfaction from conduct.

(26) A tendency to *imitation.*

(27) A feeling of *preferential taste.*

(28) *Emotional language.*

(29) *Sensuous attention.*

(30) Feelings of *means and ends.*

(31) A power of synthesizing impulses into one dominant impulse—*organic volition.*

(32) A power of synthesizing motions into one complex general action to carry out an organic volition.*

* See above, p. 157.

We shall in the next chapter proceed to consider our higher mental powers or faculties; but a few remarks may here be made in anticipation. It is the common usage to speak of our distinct "faculties," and, to a certain extent, the practice is a good one, though it may mislead. It is manifest that the mind performs a multitude of acts which more or less differ from and resemble one another; and these acts may be grouped together according to the likenesses and differences which exist between them. Thus, for example, acts of "judging" may be grouped together in one class, and acts of "willing" in another. Now, as the mind which performs these acts has, of course, the power of performing them, we may reasonably speak of these different aspects of its power as the faculty (*i.e.* the power) of judging and the faculty (*i.e.* the power) of willing. At the same time, these terms may mislead on account of the necessity we are constantly under of having recourse to material images to express such things as acts of mind. It thus comes about that, being familiar with the different parts of the body which perform the different bodily acts, the illusion may be produced that there are analogous "parts" in our intellect which perform the different mental acts. But not only have we no evidence whatever of this, but memory affords us at least *prima facie* evidence that it is, on the contrary, an absolute unity which feels, thinks, and wills now, and which felt, thought, and willed at various antecedent times.

CHAPTER XV.

OUR HIGHER MENTAL POWERS.

The correct appreciation of the value of the higher mental powers is a matter of great importance. Through intellectual perception, with its power of abstraction, we gain the highest universal ideas, the relations between which are either directly seen by intuition or gained indirectly by ratiocination. A higher order of mental affections—intellectual emotions, or sentiments—may be excited within us, in addition to our sensuous emotions.

Importance of the distinction between our higher and our lower mental faculties—Perception—The idea of "being"—Universals—Ideas contrasted with feelings—Judgment—Abstraction—Abstraction and judgment—Elements of perception and abstraction—Ideas further contrasted with feelings—Consciousness—Reflection and attention—Intellectual memory—Intellectual intuition—Reasoning, deductive and inductive—Higher emotions or sentiments—Catalogue of higher mental powers.

Importance of the distinction between our higher and our lower mental faculties.

THE last chapter was occupied with a review of our lower mental powers; our higher mental faculties next demand our attention. When we have duly considered the latter, we shall be in a position to appreciate at its true value the fundamental difference which exists between these two classes of our mental activities—the distinction between our higher, reflective, self-conscious mental acts (the acts of our intellectual faculty) and our lower, direct, merely felt acts (those of our sensitive faculty).

This is probably the most fundamental and the most important of all the distinctions to be made in the study of mind. It has been most strangely ignored from the time of Locke * to our own; but when its truth becomes gene-

* 1632-1704.

rally recognized, that recognition will occasion nothing less than a revolution in mental science. The failure to appreciate this distinction is not so much due to an exaggeration of our lower faculties, as to a want of apprehension of what is really implied in our higher mental powers. Perhaps the most remarkable circumstance connected with popular modern writers on this subject, is the conspicuous absence in them of any manifest comprehension of those very intellectual powers they continually exercise, and their apparent non-appreciation of that reason to which they so often appeal. At the beginning of the last chapter it was stated that the fact of our possessing both "sensations" and "perceptions" was one of the elementary facts of our mental experience; as also that these two kinds of mental activity, typified * the two distinct orders into which our mental faculties are divisible.

Perception. In our perception of any external object—such, *e.g.*, as a horse—we shall find, if we examine our own minds, that we acquire, in having that perception, two distinct experiences—(1) the intellectual apprehension of the object perceived, and (2) the sensations, ordinarily unnoticed, which serve to make the object known to us. This has been already, perhaps, sufficiently pointed out in the last section,† where we called attention to the "objective" (or, intellectual) and the "subjective" (or, sensuous) elements of our knowledge,‡ and to the fact that sensations are only the "means," and not the "objects" of perception. In the last chapter also we endeavoured to make clear the difference between "intellectual" and "sensuous" perception.§ Nevertheless, to guard to the best of our power against the possibility of misunderstanding, it may be well here once more to review the act of perception. When we perceive anything—for example, a white handkerchief—how do we perceive it? Through a number of impressions which it makes on our senses—such as the feeling of a white colour, of a certain apparent shape and size, a certain softness and pliability, a certain smoothness, and other feelings like those described in the last chapter as culminating in a "sense-perception."‖

* See above, p. 189. † See above, pp. 89-91.
‡ See above, p. 91. § See above, p. 188. ‖ See above, p. 189.

Through and by these various feelings (which serve us as means) we come directly to apprehend the object itself, *i.e.* the handkerchief, with all its properties. If a solid cube, suspended by a string, be turned round in front of us, we can never see the whole of it at once, and its square faces, as we see them in perspective, do not look square but lozenge-shaped. Nevertheless, these imperfect sensible signs serve perfectly well to give us a true and adequate intellectual perception of the whole cube as it is in itself. It is also most noteworthy that the very act of turning the cube round, and so changing our successive *sensations*, not only does not change our *intellectual perception* (which remains the same throughout), but our intellectual perception of the cube as one whole, as it is in itself, is actually made clearer and more steady by these very sensuous changes. We evidently more easily perceive its true character by seeing it all round (owing to its revolving) than if it were at rest, when we could only see it from one point of view.

Intellectual perception, then, is a natural and spontaneous, unconsciously-made, interpretation of sensible signs by a special power of our intelligence. But into what does this natural power interpret the signs given through our sense-organs by external things? Into some object distinct from and independent of us—some "thing in itself." In every such perception we perceive an object of some kind. It may be we know it as "a horse," or if not that, as "a quadruped" or as "a living creature" only, or merely as "a solid body," and if we cannot be sure even of that, then at least we perceive it to be something.

The idea of "being."

The word "something" is a most familiar expression, but the idea it enshrines is a very wonderful one. It is the idea of *existence*, the idea of *being*. "Being" is an idea which, familiar as it is and however much its latent implications may be unfolded, is itself utterly inexplicable; for no one can even ask what "being" or "existence" is, or what that conception means, without showing, by his very question, that he himself already both possesses and (to a certain extent at least) understands it.* The idea of

* See also below, p. 226.

"being," or "existence," is one which is applicable to everything which can be conceived of by the mind as having any reality. The other restricted apprehensions or ideas of objects, just above referred to—"solid body," "living creature," "quadruped," "horse"—are all ideas applicable to a greater or less number of distinct things. Each such conception, though applicable to a multitude of individuals of the same kind, is a conception which, considered in itself, is *one*. It is a single notion, not of any one subsisting thing, but of a kind or class of things real or possible. It refers to a whole group of objects, to each one of which the notion is applicable. It is therefore a *general* or "*universal*" idea. All such ideas are formed by a process of "*abstraction*," which will be noticed a little further on.* An idea of this latter kind, directly derived, by a natural activity of the mind, from the contemplation of objects, may be distinguished as a "*direct universal*." It is an idea abstracted from the objects which are included within it—as the idea "horse" contains and refers to the essential characters common to all horses. But the consideration of any direct universal—*e.g.* the idea "horse"—may give rise to the mental abstraction of some quality or condition pertaining to the class of objects denoted by it—as, for example, the idea "utility" or "domestication," and the idea produced by this further mental process may be distinguished as a "*true universal*." Our "direct universals" are, no doubt, gained through the help of those groups of feelings noticed in the last chapter† as mental images of a generalized kind. Such images are doubtless generated in our organism, and each such is a unity of its own sort, and may (by analogy with the above intellectual universals, the formation of which it facilitates) be distinguished as a "*sensuous universal*." But even a direct universal (such, *e.g.*, as the idea "horse") is not a mere collection of sensuous impressions and feelings such as is a "sensuous universal," but is a single intellectual perception of an object, as being of a certain kind, or nature, revealed to us by our power of abstraction. By it we gain those intellectual ideas to which certain groups of feelings have, in the last chapter, been

Universals.

* See below, p. 211.

† See above, p. 191.

shown to correspond,* such as feelings of activity, passivity, self, not-self, extension, position, shape, size, number, etc. By the help of these feelings, our intellect obtains a number of highly abstract ideas, such as the ideas of being, substance, activity, passivity, self, not-self, difference, succession, extension, position, shape, size, number, motion, novelty, dubiousness, agreement, disagreement, etc., as also those of cause and effect, truth, goodness, and beauty. The idea of "being" is the most universal of all universals and the most abstract of all abstractions, and it serves particularly well to show the profound difference between an *idea*—that is, an intellectual perception, or perception of our higher mental nature—and a mere sense perception.

Ideas contrasted with feelings.

The contrast, the difference of *kind*, which exists between an idea and all those varieties of feelings and groups of feelings which we have successively passed in review in the last chapter, is very great. "Feelings," whether single or in groups of groups, are all modifications of our sensitivity, and cannot be reflected upon, or recognized as existing, by the faculty (sensitivity) which elicits them. But ideas can be reflected upon, and recognized, by the faculty (the intellect) which elicits them, as existing now; as having, or not having, existed in the past; and as possibly or certainly existing, or not existing, in the future. "Feelings" may associate to form "sensuous universals," serving to guide our consentience automatically. But "ideas" are direct or true universals, serving to guide us not blindly, but consciously and intelligently. "Sense perceptions" are groups of associated feelings, but "ideas" are apprehensions of objective qualities grouped round an objective unity about which various judgments may be formed. The former are but reinstatements of sense, the latter are unities abstracted from sense. There are, indeed, as we have said, feelings of self-activity and passivity, of power exerted by us and upon us, etc., but we have no feeling of the active nature of our activity, or that our passivity is passive, or of power neither exerted by us nor upon us, etc. Similarly as to those of our feelings which relate to succession, extension, position, shape, size, number, motion, etc., we have

* See above, pp. 189-193.

those feelings indeed, but no feeling of our having such feelings; recognition of that kind is an *intellectual* act, an act of knowledge, and no mere feeling. It is quite otherwise with our ideas, each of which may be perceived and recognized as being the sort of idea it is. It has been affirmed, indeed, that the only real difference between feelings of passivity, motion, resistance, etc., and ideas of passivity, motion, resistance, etc., is due to our mental use of words in the case of our ideas and to their non-use in our feelings. This objection will be met in the next chapter, and shown to be untenable,* because intellectual perceptions and ideas precede the use of words, and therefore cannot possibly be due to the latter.

In all those states of our unconscious and merely consentient activity—habitual actions, sleep-walking, etc.—which were noted in the last chapter, there is no recognition of external objects as being external objects. Each object excites its own impressions on us, and these impressions elicit corresponding appropriate actions on our part, and similar causes (similar excitations) produce in us similar effects (similar actions). But the mind, in this condition, in spite of its effective action on our motor powers, does not apprehend that the objects thus *practically* recognized by our organism as alike, really belong to one kind or class of existences. It automatically and, as it were, mechanically sorts them, but is not aware of the nature of the groups of objects thus sorted.† They are not what is called "formally" sorted and recognized, but only "materially" so.‡

The profound and essential difference between (1) an idea and (2) a feeling or group of feelings is, as we just observed, particularly conspicuous with respect to our idea of "being" or "existence." That idea is so fundamental that it is applicable to everything, while, if we have it not, nothing can be apprehended or understood. It is applicable both to the subject (*i.e.* the mind which thinks) and to the object thought about; for it is clear that both of these are and must be "beings" of some kind. Yet no sensation

* See below, "Roots and the Origin of Language," p. 232.

† See above, p. 192.

‡ For another example of the use of these terms, see chap. xvii., "Objectivity of Truth."

or group of feelings, however complex, could give us a *feeling* of "being," because though there are special groups of feelings corresponding with our self-activity, and special groups of feelings corresponding with our passivity and the action of external things on us, there neither is nor can be any kind of feeling embracing all other feelings, as the idea of "being" embraces all other ideas. There neither is nor can be any one feeling common to all other feelings; and yet if there was a feeling of "being" at all, it must be of this universality of nature, while at the same time it must be a distinguishable feeling. Nevertheless, though we have no *feeling* of "being," the *idea* of "being" lies at the very root of all our conceptions. As long as we think at all, we must possess it; while it exists at the very beginning of our intellectual life. This supreme and most abstract idea arises spontaneously in the mind of the little child who lisps, "What is that thing, mother?" It may, indeed, often be clearly perceived to have so arisen even before a child has acquired the power to speak.

It is nevertheless quite true, as was before pointed out,* that we cannot have any of the ideas or notions which perception or reflection give us, without first having corresponding sense-impressions, imaginations, or sense-perceptions to act as their basis and support. That such antecedents are necessary, is a simple fact of observation. They are amongst the results which spring from our bodily organization. Our minds are first of all aroused to activity by the action of surrounding bodies on our sense-organs and sensitivity, and afterwards by the play of our imagination; and throughout life some play of the imagination is a necessary accompaniment of all our intellectual activity. But to suppose that an idea is an imagination, because it cannot exist in our mind without the presence of one or more imaginations which may serve to support it, would be as absurd as to suppose that wine and the bottle which contains it are the same, because the fluid cannot be kept together except by means of some vessel, which may serve to hold it. One wonderful difference between our sensitive power and our intellectual faculty is, that the latter has by

* See above, pp. 87, 88.

its exercise the power of acquiring an enormous multitude of new ideas, while the number of possible sensations and new groups of sensations remains very limited in comparison. In every perception which we experience, there are, we must once more insist, two constituent factors: (1) the sensuous, subjective factor, which is a product of our lower mental faculty of sensitivity, and which is made up of the feelings excited by an object, together with the various groups of reminiscences and emotions connected therewith; (2) the intellectual, objective factor, which is a product of our higher mental faculty of intellectual intuition,* and is an apprehension of the object as it really exists in itself, apart from those sensations, reminiscences, and emotions which have enabled us to elicit that apprehension.

With respect to the fundamental distinctness which exists between ideas and mere groups of feelings, it has been, further, before pointed out † that through feelings we can "both perceive and conceive things that never were and never can be imagined;" that such feelings serve to make objects "directly present to our intellect;" ‡ that perception is neither a process of conscious nor unconscious inference,§ and that it is certified for us by attention.‖ It has also been shown that every perception, far from being a mere plexus or amalgam of feelings, contains implicitly the ideas of "existence," "distinction," "similarity," "unity," and "truth;" ¶ and that the fact of the feelings, which give rise to a perception being able to persist side by side with the perception they have elicited, shows that the latter (*i.e.* the perception) must be something new and different from the former (*i.e.* the feelings).** The distinctness in nature of intellectual perceptions, or ideas, has been illustrated †† by the ideas "experience," "seeing," and "nonentity." The fundamental distinction which exists between our powers of imagination and conception has also been insisted on,‡‡ and the necessary supremacy of thought over feelings, as an ultimate court of appeal and supreme criterion pointed out.§§ Finally, it has been demonstrated ‖‖ that a

* See above, p. 113. † See p. 89. ‡ See p. 91.
§ See p. 92. ‖ See p. 95. ¶ See p. 103.
** See p. 105. †† See pp. 109, 110. ‡‡ See p. 111.
§§ See p. 113. ‖‖ See p. 102.

greater degree of vividness is by no means (as it has so often been asserted to be) the distinguishing character between sensations and ideas.

But the intellectual, objective constituent factor of our perceptions is itself twofold.* We may distinguish two distinct notions, or modes of apprehension, in it. On the one hand, it apprehends what kind of thing the object perceived may be—its "thatness," so to speak. On the other hand, it apprehends the actual *subsistence* of the thing perceived. Perception, then, is the apprehension of the *subsistence* of a thing the nature of which is revealed to us through the feelings we experience in connection with it, and is an implicit act of judgment that the thing perceived is of some definite kind. From this we may rapidly pass to an *explicit* and formal, deliberate *judgment* that such is really the case, and the examination of this second act will serve to bring out yet more plainly the difference of kind which exists between "feelings" and "ideas," and therefore between our lower and our higher mental powers. A *judgment* is a mental affirmation which follows upon, and is the consequence of, antecedent perceptions.

Judgment.

Every object which we perceive, possesses a number of different qualities—shape, size, colour, hardness, etc.—and acts on our sensitivity accordingly. Its qualities (at least, some of them) affect us simultaneously with our perception of the object which possesses them. But the act by which we perceive them is different from that by which we perceive the object as one whole. Perception is the acquisition of one idea through a multitude of sensations; but an explicit judgment involves, first, the ideal separation, and then the ideal union of the qualities of the object about which we judge, as will directly appear. Our attention may be directed to various qualities according to the different circumstances of each case, and then these qualities may be distinctly and expressly recognized as really being qualities of the object observed.

The power by which we thus ideally separate qualities,

Abstraction.

* I desire here to call attention to M. de Broglie's excellent work, "Le Positivism et la science experimentale," to which I am greatly indebted.

is the power of *abstraction*, and by it our mind isolates (in order to apprehend them distinctly) the various qualities and conditions which really exist in the concrete object perceived and can, of course, be only separated from that object ideally. No sooner has any object—such, for example, as an oak-tree—been perceived by us as a distinct subsisting reality, than it undergoes this singular transformation in our minds. The various qualities which, in truth, are intimately united in and with the real, substantial oak-tree, are ideally detached from it, and isolated in our minds, and regarded in themselves—not, of course, that we make the absurd mistake of thinking they can exist by themselves. Thus, in the initial stage of a judgment, such as, "*That is an oak*," its various qualities, such as "solidity," "branching shape," "vegetable nature," etc., are abstracted by our minds, and so the abstract idea, "an oak," is distinctly apprehended by the help of a number of subordinate abstract ideas. They are called "abstract" because they are thus "*abstracted*" by the mind—in which they only exist *ideally*—from the object, in which alone they exist *really*. What are the various qualities of any object —its shape, size, colour, etc.? They are in reality so many states or conditions of one actual, really-subsisting, material thing. But they also have an ideal existence, as so many abstract ideas, in the mind which apprehends them. Let us for a moment consider the "branching shape" of the oak, as it exists in reality, apart from any mental act of abstraction, and as it exists ideally after the act of abstraction. In *reality*, it exists as one of the qualities and aspects of *that one, particular, individual oak*, a quality actually united indissolubly with it, and not existing at all except in that one particular oak-tree. Ideally, as an abstract idea, it is a general conception, applicable not only to all oaks, but to all other branching things also—it is a "true universal." * One very important, primary, and fundamental abstraction is that which we have already glanced at. In order to be able to think, "That object is an oak-tree," we must (as before said) have the conception of the kind of thing the object is—"what" it is, or the idea of its "whatness."

* See above, p. 206.

At the same time our intention is not to mentally affirm that a *kind* exists, but that a *real concrete thing of a certain kind* exists; and this is a uniting together of the idea of a "whatness" with the idea of a "real existence." We must, therefore, have mentally separated the idea of the oak-tree as an oak-tree, from that of the concrete existence, or subsistence, of that concrete material thing—for obviously we could not mentally unite together in the mind what did not exist separately therein.

This process of mental abstraction is a necessary result of our nature. In the presence of any object apprehended by us, it is actually impossible for us not to apprehend some or other of its qualities. As soon as we begin to use our reason, as soon as we ask ourselves what anything is, and try to have any clear and distinct notion about it, we are compelled thus to ideally, or mentally, separate its qualities by abstraction. But we cannot, by mere abstraction, form any judgment. In order to do that, there must be a second and reverse process—a putting ideally together again what has just been ideally separated. For during our process of abstraction we do not cease to feel the object acting on our sensitivity—or we remember it in our imagination—and our mind has never lost sight of the real unity—the concrete identity—of the oak-tree, the qualities of which we have mentally (ideally) abstracted. For the intellect (which, being conscious, knows what it does), when it has analyzed the oak it has perceived, into its ideal elements, immediately recognizes the real unity and concrete identity existing between the qualities it has ideally abstracted and the object whence it has abstracted them. It is the expression of this perception of unity, together with abstraction, which constitutes the explicit judgment.

Thus a judgment completes by union, or synthesis, a process which it began by separation, or analysis. The intellect, by its judgment, "That is an oak," declares, virtually, that its abstraction has only been ideal, and that the elements which it has ideally separated exist, in fact, united in the really subsisting concrete oak-tree. Thus for every judgment, expressing even the very simplest *Abstraction and judgment.*

affirmation, three mental acts are necessary: (1) a perception, or the apprehension of some object through a union, or synthesis of feelings, produced by the qualities of that object; (2) a mental *analysis*, or ideal separation by abstraction, of the qualities of the object; and (3) a mental synthesis of these abstracted qualities with the object. Judgments are amongst the elementary acts of the human intelligence, which cannot exist without them. The human intellect, therefore, is an intelligence which necessarily proceeds by an alternate process of union or "synthesis," and of separation or "analysis." It is an active principle which operates by alternately uniting and dividing. This complicated process is necessary because, in order that we may understand any object, it needs to be, as it were, first digested by our mind, in order that it may be assimilated—just as our bodily food cannot be assimilated without first being digested. In this process it is abstraction which plays the part of a mental gastric juice, ideally separating the qualities of every object, and so making them clear and luminous to us. A moment's consideration will suffice to show how much better such qualities as "solidity," "branching shape," etc., can be apprehended after they have been thus abstracted and distinctly regarded, than when they were apprehended confusedly and indistinctly in one lump, in our first act of perception of the object whence they were afterwards abstracted. This complex process, which it takes so long to describe, is performed by the mind with unimaginable rapidity—the rapidity of thought! It is all done while we form the conception, "That is an oak."

That we should do all this without being aware of it may seem strange. Yet it need not appear so. How many persons say "*b*" without ever thinking, or even knowing, that in order to utter it they must, if the mouth be open, first close and then reopen the lips! But how inexpressibly more subtle and imperceptible is a mental act, than are such conspicuous muscular movements as those of the lips!

Elements of perception and abstraction.

It may be well here to say a few words to guard against a by no means impossible error. In *perception*, a variety of elements are united, and elicit the idea of a dis-

tinct object. In *abstraction*, we resolve the notion of a perceived object into a number of elements. It might, then, be supposed that the elements into which any notion is resolved by abstraction are those very same elements through which that notion had previously been gained. In other words, it might be supposed that "abstraction" was some sort of return towards the condition which existed in us the moment before "perception." But to suppose this would be to make a great mistake. The elements which minister to perception are *sensible* elements —feelings of various kinds excited in us by the object perceived. They are modifications of our organs of sense and affections of our sensitivity. They are essentially individual and subjective. The elements which are separated by abstraction are *ideal* elements. They are abstract general ideas, and are essentially universal and objective. That we may see this clearly, let us consider an example in point, *e.g.* the elements of either kind related to our perception of the oak-tree. We experience in its presence, feelings of colour, of limitation of coloured surfaces, perhaps a feeling of rustling sound, with corresponding feelings of moving patches of colour, as the twigs and leaves sway to and fro in the wind. If we go close, we may have also feelings of rough contact and pressure, and of muscular movements and inter-relations of our bodily parts corresponding with groups of branches and twigs. Each such feeling is an individual feeling then and there present, which may be accompanied with revivals in the imagination of kindred feelings formerly experienced. Such are the elements which elicit the perception. That perception itself once attained, the idea of the oak may then be analyzed by abstraction into the abstract ideas—solidity, vitality, branching shape, vegetable nature, oak nature, acorn-producing organism, ship-building substance, past aid to the greatness of our nation, etc. Every one of these ideas is a universal notion, and is applicable to a multitude of individual objects besides the one perceived, and is seen to be applicable to objects of the kind which have existed in the past, or which may exist in the future.

Moreover, in many instances, abstract ideas by no

means correspond with the sensible signs which have served to elicit them. Thus, for example, the one abstract idea, "motion," may be apprehended through a number of very different sensible signs, such as (1) the travelling of the image of an object over our field of vision; (2) a feeling of anything slipping over the skin; (3) by muscular feelings and feelings of tension in our eyeballs as we follow with our eyes an object in motion; (4) by sensations of touch which we may receive from a moving object while we grasp it, etc. Yet the resulting idea, "motion," is *one and the same* idea, however differently it may be called forth.* But not only may a multitude of different sensible signs minister to and serve to elicit one and the same idea, but also the very same set of sensible signs may minister to and serve to elicit a variety of very different ideas. Thus the sight of a single photograph of the Queen may give rise (1) to the idea of her Majesty herself; (2) to the idea of royal rank; (3) to the idea of a woman; (4) to the idea of a human being; (5) to the idea of likeness; (6) to the idea of chemical action; (7) to the idea of the sun's actinic power; (8) to the idea of the effect of light and shade; (9) to the idea of paper; (10) to the idea of an inanimate object; (11) to the idea of substance; and finally (12) to the idea of "being" or "existence."

Ideas further contrasted with feelings.

Again, *feelings*, as before said, can never be reflective. They can never reflect on feelings. We may have, as has been pointed out, feelings of self-activity, passivity, etc.; but not of any one feeling being of the kind it is. It is quite otherwise with our ideas; not only may an ideal abstract quality be made a direct object of thought, and be, as it were, held up opposite the mind for examination; but the idea itself may be perceived and recognized as being whatever sort of idea it may happen to be. Moreover, the very *intensity of the action* of sensation (as with a very dazzling light or deafening sound) may make *sense*-perception impossible; but no amount of *intensity of the action* of the understanding, no amount of vividness in an idea, will mar *intellectual* perception. It is impossible for ideas to be too clear and distinct.

* See also above, p. 106.

No efforts of our imagination, moreover, can ever exceed sensuous experience. We can never imagine what we have not felt in itself or in its elements; but it is quite otherwise with ideas, as we have before seen with respect to "experience," "seeing," * etc. We can not only conceive of, but we know perfectly well, both our power and our act of sight. Yet that act itself was never felt, and cannot therefore be imagined.

Feelings become associated according as they have been before felt most frequently in succession; but ideas may become associated together according to their rational relations—their logical dependence one on another. Thus the thought of "Ireland" or of "disunion," may be associated in our minds with the ideas of the humour of Daniel O'Connell, or of the timbre of Mr. Gladstone's voice.

There is yet another contrast between feeling and thought. All feelings are the direct result of the energy of organs of sense, and are necessarily limited by the nature and capacities of those organs. But the intellect not only has no known organ, but, for reasons which will appear later on,† cannot have one. Nevertheless, some action of the organism is necessary for thought—namely, such action as is required to elicit those mental images without which thought, as we experience it, cannot exist. Therefore such action is indirectly necessary for the highest acts of our intellect. But this action is not necessary for the action of the intellect *as* intellect, but only for those material concomitants (words, images, or other symbols) which the mind needs for its activity here and now. The action of the organism is, however, necessary for feeling, *as* feeling. It is no wonder, then, that the relatively defective nature of "feeling" and its impotence to make any declaration about truth, does not occasion a similar inadequacy and impotence with respect to "thought;" since "feeling" is itself the energy of a material organ, which "thought," in itself, is not. The intellect declares that its own declarations as to universal, necessary, and self-evident truths, are absolutely true declarations; but

* See above, p. 109. † See below, chap. xxv.

sense is altogether silent about truth and about the value of its own deliverances.

Such, then, is the fundamental difference of *kind* between our "feelings" and our "ideas"—between our lower and our higher mental faculties. This distinction, which is really one of the most important in the whole study of mind and of man, is almost always entirely passed over and ignored. It is on this account that we have insisted on its characteristics with much, we hope pardonable, reiteration.

Consciousness.

Having now finally considered this fundamental difference between "feelings" and "ideas," we may proceed to advert to "consciousness," which is at the foundation of our whole intellectual life, as the parallel affection of our lower mental nature, "consentience,"* is at the foundation of our whole sensuous life.

Consciousness is, for each of us, both an ultimate fact and an ultimate abstract truth. As an ultimate fact, it is that actual concrete knowledge of our present existence (in whatever state it may be) which we all have in our waking life, and our certain knowledge and perception of which no sceptic ever ventures to dispute—as was pointed out in the beginning of the work.† It is a fact which, like all ultimate facts, is necessarily quite inexplicable. We know that we are conscious as a fact, but how that fact comes about, is as inexplicable as is our knowledge of primary universal truths‡ or of external things and their qualities.§

As an abstract truth, consciousness is the ideal perception the mind gains and abstracts from that intimately known concrete fact, its own actual present existence. Abstract consciousness is, of course, only an idea, and has no real existence except in the actual, concrete, living consciousness of an individual, conscious being.

Consciousness, though existing at each instant, is in its very essence continuous, and conscious of its own persistence. We each of us know and are conscious not only that we are doing what we are doing (*e.g.* the reader,

* As to this, see above, p. 183.

† See above, p. 17.

‡ See p. 44.

§ See p. 89.

reading this page), but also that we began to do it, and were doing something else before we so began. The supposition that consciousness could be composed of an aggregate of separate "states" of consciousness, is an absurdity. Such separate "states," if each be aware only of itself, could not constitute that kind of consciousness which we know we have; and which is aware of itself as a unity, and also of the successive series of states through which it has passed. But if any separate "state" be supposed to be aware of other states of consciousness, then there is just as much mystery and difficulty in understanding that "state," as in understanding a persistent consciousness; so that the hypothesis of consciousness, being nothing but an aggregate of "states," becomes not only an absurdity, but an utterly gratuitous absurdity. Consciousness, then, is essentially a persistent intelligence which, as a fixed point, reviews the procession of events, and recognizes them as severally belonging either to the order of ideas or to that of actual, real existences. We can now have no difficulty in recognizing the certainty that we may be conscious, not only that we can think of an ideal horse, but also that we can perceive a real one; if, that is, we have, in Section II., successfully disposed of the delusions of idealism.

Consentience, like all the other feelings, cannot reflect on itself; but this, of course, consciousness most frequently does, and it can and does recognize itself for what it is. Consciousness also cannot, like sensitivity, be paralyzed by its own energy. We do not cease to be conscious through the clearness and distinctness of our perception of our own being.

Reflection and attention.

We have more than once pointed out how feelings cannot reflect upon themselves, though it is manifest that we can direct our attention upon both our feelings and our thoughts, and reflect about them. This power of reflection (which was specially noticed in the first chapter *) is, then, one of our higher mental powers, as also is that of voluntary attention—as distinguished from that merely sensuous attention to which we adverted in the last chapter.†

Conscious reflection and attention also accompany and

* See above, p. 8. † See above, p. 198.

Intellectual memory.

serve the next higher mental power we would here call the reader's attention to, namely, *intellectual memory*. This faculty we have already treated of in the second chapter,* where we showed the distinction between its two forms, which were distinguished respectively as † "recollections" and "reminiscences," while the distinctness of merely *sensuous memory* was pointed out in the last chapter. ‡ Although we are said, in popular parlance, to "recollect" anything we have so long been in the habit of doing that we can do it automatically, yet unless the mind recognizes the past as past, it cannot be said to be a true act of memory.

Intellectual intuition.

Next amongst our higher mental faculties may be enumerated that by which we apprehend absolute, universal, necessary truths, such as those treated of in the fourth chapter, § namely, the "law of contradiction," ‖ the axiom about equality, ¶ the idea of cause and the law of causation,** the conception of the highly abstract idea, "Power or force," †† etc. It is this faculty which, in its form of consciousness, recognizes the certainty of our own existence, and is the ultimate criterion ‡‡ of all truth and certainty, and of the evidence of what is evidently true—whether it be a general truth, a particular fact, or the force of a logical argument. Our sense-knowledge, as we have seen, §§ is limited by our organization. Not so our intellectual intuition, which tells us, if it tells us anything, that the law of contradiction must be absolutely and universally true. ‖‖ To doubt, then, that our intellectual intuition can give us certain and absolute knowledge, logically entails the mental paralysis of complete scepticism.

Reasoning, deductive and inductive.

Two other of our higher faculties are two powers of reasoning, or of true, that is, *intellectual*, inference. One of these is the faculty of *intellectual analysis, deduction, and ratiocination*, which formed the subject of our fifth chapter. ¶¶ It is the faculty by which we apprehend the force of the idea expressed by the word "therefore"—

* See p. 29. † See p. 31. ‡ See p. 186.
§ See p. 38. ‖ See p. 39. ¶ See p. 46.
** See p. 48. †† See p. 50. ‡‡ See p. 113.
§§ See p. 182. ‖‖ See p. 42. ¶¶ See p. 53.

a term we use to denote the certainty which we feel about anything in and because its certainty is involved in that of some facts or principles previously known. It is also the faculty by which we dissect ideas and find within them, and explicitly recognize, what before was therein latent and only implicitly contained*—as when we analyze the word "merit," and find that it contains and implies the idea of something well done, and the idea of an action not done under compulsion; for no such action can have "merit." The second reasoning faculty is that of *intellectual synthesis or induction*, by which we unite ideas gained from different perceptions, and so give rise to the perception of a new truth—as when, by the study of many fossils and geological formations, we recognize the truth that the earth was inhabited by different animals at different periods of its history. This, further developed, is that speculative process of reason which starts hypotheses and predicts.

We have recognized the existence in ourselves of appetites and desires,† feelings of pleasure and pain,‡ and feelings of a taste for certain attractions,§ some or all of which may co-operate in exciting our merely sensuous emotions.‖

Higher emotions or sentiments.

When our spontaneous feelings of taste are acted upon, and the object attracting us is recognized as really possessing claims on our admiration, such mere feeling has then elicited an intellectual perception of "beauty" of some kind—a matter which will engage our attention later on¶—together with our perceptions of "goodness" and "truth."

Apart, however, from such perceptions, we would here advert to the pleasurable or painful feelings which may accompany them, and also accompany other actions of the higher mental faculties. Feelings thus called forth constitute our higher, or truly intellectual, emotions, which are of the greatest value and importance in human life, as powerful aids to good conduct and often to just

* See p. 23. † See p. 195. ‡ See p. 181.
§ See p. 197. ‖ See p. 186.
¶ See below, chap. xvii.

judgment.* We may find an example of such higher emotion in the pleasure we sometimes experience on at last seeing the solution of some difficult problem, and a pleasurable sentiment often attends the attainment of truth. Emotions produced by the perception of musical harmony of the highest kind, by beautiful scenery, or some ruin full of historic memories, and the reverence which may be excited in us by seeing a person whose character we hold in the highest esteem, are all examples of affections of our higher mental faculties—intellectual *sentiments*. One very important higher emotion is that which is called forth by our perception of the moral worth of any action we may contemplate or perform (as on witnessing some act of exemplary kindness or of heroically generous self-denial), and which sentiment is to be distinguished as the *moral sense*. It has for its material basis that feeling of pleasurable satisfaction from conduct before referred to.† How little these higher sentiments have to do with our lower, merely sensuous, feelings, a very slight introspection may suffice to assure us. We have carefully pointed out in the last chapter that our feelings spontaneously express themselves by a language of the emotions; but we have also, as everybody knows, a power of speech whereby we express our ideas. It is a fundamentally different power, but the question requires to be treated separately, and its consideration will occupy our next chapter.

Finally, we have a power of will, fundamentally different from that organic volition before described;‡ although a certain exercise of will attends every act of perception and judgment, as does also some feeling or sentiment, and some feeling or sentiment as well as some intellectual perception attends every act of volition.§ This power of volition, however, needs a chapter to itself. Nevertheless we will, by anticipation, include it (with the other higher faculties which have just been declared to need separate treatment) in the following list of our higher mental powers. These powers may be said to be—

* This will be further explained in Sect. V. chap. xxvi.
† See above, p. 194. ‡ See above, p. 198.
§ This fact will be more fully pointed out in chap. xxvi.

Catalogue of higher mental powers.

(1) As the foundation of all, a power of apprehending objects as they are in themselves, through the impressions they make on us—*intellectual perception.*

(2) A power of directly perceiving our own activity—*self-consciousness.*

(3) A power of turning the mind back upon what has before been directly apprehended—*reflection.*

(4) A power of actively seeking to recall things to mind, or of recognizing spontaneously arising reminiscences as pertaining to the past—*intellectual memory.*

(5) A power of forming abstract ideas, or "true universals," such as those of being, substance, cause, activity, passivity, self, not-self, difference, succession, extension, position, shape, size, number, motion, novelty, dubiousness, agreement, disagreement, truth, goodness, beauty, etc.—*abstraction.*

(6) A power of uniting our intellectual apprehensions into an explicit affirmation or negation—*judgment.*

(7) A power of combining ideas and observations, and so giving rise to the perception of new truths—*intellectual synthesis and induction.*

(8) A power of dissecting ideas, and so gaining new truths, apprehending truths as being necessarily involved in judgments previously made—*intellectual analysis and deduction, or ratiocination.*

(9) A power which, though mentioned almost last, is indeed primary by nature—namely, a power of apprehending self-evident truths as such, and as absolutely, positively, and universally necessary—*intellectual intuition.*

(10) A power of pleasurable or painful excitement on the occurrence of certain intellectual apprehensions—*higher (intellectual) emotions or sentiments.*

(11) A power of apprehending highly abstract ideas, such as being, power, beauty, goodness, and truth.

(12) A power of giving expression to our ideas by external bodily signs—*rational language.*

(13) A true power of will; that is a power of, on certain occasions, deliberately electing to act (or to abstain from acting) either with, or in opposition to, the resultant of involuntary attractions and repulsions—*rational volition.*

CHAPTER XVI.

LANGUAGE.

Intellectual language is a product of thought. It can exist without speech, and could never have arisen as a product of articulate sounds which did not express abstract ideas.

The imagination of words or bodily movements necessary for thought—Examples of emotional and intellectual language contrasted—Abstract ideas must coexist with speech—May exist without speech—Deaf-mutes—Language a consequence of thought—A tendency towards language seems innate—Roots, and the question of the origin of language—Kinds of language—The mental and the spoken word.

WE have already seen * that bodily signs or gestures, and also both inarticulate and articulate sounds, may be employed to give expression to our feelings or emotions, apart from our intellectual perceptions, and apart from all intention of affirming, denying, or asking anything. We have now to consider language in the ordinary sense of that word—as a medium for expressing ideas and intentions, asking questions, stating facts, and carrying on conversation.

The imagination of words or bodily movement necessary for thought.

In the first place, an examination of our own minds shows us, not only that we cannot make known our thoughts to others save by the help of bodily signs, but also that we ourselves cannot even think without their aid. I do not, of course, mean that we cannot think without either speaking or making gestures, but that we cannot think without some imagination, either of words as spoken, heard, or read, or of gestures as seen in reality, or in pictures, or as

* See above, p. 196.

felt. It is by the help of imagined words, that we mostly do our thinking; we almost always think in words. Nevertheless, we may also think by merely imagining certain bodily activities, without adverting to the articulate sounds by which we denote such actions. We may think by the help of the imagination of such actions as we have actually seen performed, or as we have felt the performance of, when we ourselves have been performing them. Nevertheless, these thoughts of ours, though thus helped by the use of imagination, are themselves no mere imaginations. The idea, for example, of "moving," when thought by the aid of the imagined motions of ourselves or others, is as truly an intellectual conception—as abstract, as universal, as implicitly replete with the ideas of unity, being, and truth, and the other characters we have before pointed out* which distinguish ideas from feelings and imaginations—as is the same idea when thought out by the help of the imagined articulate sound conventionally employed to denote that action.

Nevertheless, since we ordinarily mean, by "language," spoken articulate sounds, serving for intellectual intercourse we will begin by examining some such sounds, selecting certain concrete examples of very simple intellectual language, which can be conveniently contrasted with the mere language of emotion. Let us, then, suppose that two men are standing under an oak tree, and that this tree begins suddenly to show signs of falling. They will fly from the danger, and they may utter cries of alarm, and by their cries and gestures give rise to sympathetic feelings of alarm in persons who may happen to be near the spot. In so far as they do no more than this, their language, whether of voice or gesture, is but that language of emotion we have already adverted to.† They may, however, cry out, "That oak is falling!" What is the nature of these sounds? The words are examples of intellectual language. They are the embodiment and expression of no mere feelings, but of universal, abstract ideas.

Exam. of emo and in lectual language contrasted.

(1) The word *oak* is, of course, a conventional sign for the idea "oak," and is a universal abstract term, applicable,

* See above, pp. 207, 216. † See above, p. 196.

over and above the particular oak which is about to fall, to every other actual or possible oak. It denotes no single subsisting thing, but a kind or whole class of things.

(2) The word *that*, is a term which divides and separates off the one particular falling oak referred to from all others, and limits and determines the application of the universal abstract term "oak" to a single concrete example. It implies an idea of a unity of a different sort from the unity implied by the word "oak." The latter implies a unity of nature or kind, which may be present in an indefinite number of individuals; but the word "that," conveys the idea of an absolutely individual unity which can be present in nothing but itself.

(3) The word *is*, denotes the most wonderful, important, and most abstract of all abstract ideas—the idea of "existence" or "being." It is an idea * which we must have in order to perform any intellectual act. It is an idea which, though not itself at first adverted to, makes all other ideas intelligible to us, as light, though itself unseen, renders everything else visible to us.

(4) The word *falling*, is a term denoting another abstraction—an abstract "quality" or "state." The idea is one which is evidently capable of very wide application, namely, to everything which may fall. Yet the idea itself is one single idea.

Abstract ideas must coexist with speech.

What is true of this simple sentence is true of all sentences. All human language (apart from mere emotional manifestations) necessarily implies and gives expression to a number of abstract ideas. It is impossible even for the most brutal savage to speak the simplest sentence without having first formed for himself highly abstract ideas. Wherever, therefore, language exists, there also must exist the power and exercise of abstraction. All our words, except proper names, pronouns, and certain determinating adjectives and participles, express abstract ideas. Universal abstract terms are made use of spontaneously by children as soon as they begin to speak, and "quack-quack" and "gee-gee" are just as good abstract universal terms as are "duck" and "horse." Children

* See above, p. 205.

begin by giving terms very wide meanings, which they subsequently learn to restrict. Not uncommonly children call all men "papa" at first, and the child of a friend of mine thus gave the word "quack" so wide a meaning that he included under it not only all birds and insects, but also liquids, and money which had the French eagle on one side of it. Professor Preyer, of Jena, tells us of a child ten months old who used one term to denote both "above" and "below," and another single word to signify both "hot" and "cold." He also gives an instance of a girl fourteen months old who used the term "apple" to denote not only "apple," but every kind of food—food in the abstract. He also relates * that a boy thirty-one months old, when vexed with his plaything, would say, "dummes *ding*," thus rising at once to the highest of all abstractions —the idea of "being."

May exist without speech.

The faculty of abstraction, then, must be possessed by every one who speaks. But it is also possessed by men who do not speak. Various kinds and degrees of dumbness may arise from different forms of defective memory as to words, due to different physical defects of brain-structure—such defects impairing those powers of feeling and imagination on the integrity of which the exercise of our intellectual faculties depends. In such cases intellectual action is impaired by defects in parts of the bodily organization, the healthy activity of which is a condition precedent to such intellectual action. But it may be the case that the physical defect is not in such parts, but in others the healthy activity of which is requisite for the external manifestation of conceptions duly formed in the mind. Persons afflicted with defects in such parts of the brain (such central part of the speaking apparatus) may have perfectly clear ideas, but be quite unable to frame and utter corresponding expressions. The absence of words does not necessarily imply the absence of ideas. Young children often plainly indicate that they have meanings, a knowledge of which they seek to convey before they can speak. A friend of mine was much alarmed about his son (who is now a very clever young man), because he was long unable

* "L'Ame de l'Enfant," pp. 355, 367, 431. Paris: 1887.

to speak, though he showed clearly, by an elaborate language of gestures, that he had very distinct intellectual conceptions. Preyer mentions * having shown a son of his, unable to speak a word and less than a year old, a stuffed goose, saying, "bird," upon which the child looked across at a stuffed owl on the opposite side of the room, thus evidently connecting the two objects in his mind.

Deaf-mutes. But that ideas may, without the use of speech, be not only conceived, but also distinctly enunciated and freely communicated, is made evident to us by deaf-mutes. They can and do express "ideas" by their gestures. At an institution for the dumb in Edinburgh, the Lord's Prayer is acted by mutes in an elaborate manner. The idea "Father" is expressed by an action indicating "old man;" the idea "Name" by touching the forehead and indicating the action of spelling on the fingers; the idea "done" by the hands working; the conception "on earth as it is in heaven," by the two signs for "heaven" and "earth," and by putting the two forefingers side by side to express "equality;" and so on. But the satisfactory nature to mutes themselves of their own gesture-language, is shown by the protests made by some of them in the newspapers a few years ago in its favour, and against the practice of teaching them to utter articulate sounds through a study of the lip-motions of normally speaking people. The great expressiveness of such gesture-language is also demonstrated to us by the performance of whole plays by gesture, without the utterance of a single word, as in various ballets.† It is also demonstrated to us by the carrying out of Church services ‡ by gesture only—services attentively followed by the deaf congregations which assemble to profit by them.

As to the thorough intellectuality and power of communicating their ideas which deaf-mutes possess, Herr Oehlvein, who was director of the Institution for the Education of the Deaf and Dumb at Jena, has made the following

* *Loc. cit.*, p. 355.

† The elaborate ballet called "La Jolie Fille de Gand," which is a serious play in several acts, may be specially referred to.

‡ A very interesting service of this kind is to be seen at the church for the deaf in Oxford Street.

statements:* "The deaf-mute represents objects which have become known to him through his senses of sight and touch, by corresponding signs. For this purpose he makes use of the means with which nature has furnished him, namely, movements of the muscles of his eyeballs and of his limbs. Though so much bodily movement seems at first to lend more vivacity to his expressions, yet it is much more difficult for him thus to express general ideas than it is for other men to express such ideas by words. The deaf-mute who wishes to express the general idea 'red colour,' does so by gently touching his lips; and he will make use of this gesture to denote the redness of the sky, or of painted objects, or red stuffs or flowers. But however numerous may be the objects thus designated, the idea 'red' is for him a *unity*, and before thus expressing it he must also have acquired the general ideas 'lips,' 'sky,' 'stuffs,' 'flowers,' etc. Thus the deaf-mute, when he invents a sign for anything, applies it to all other things of the same class according to his conception of that class. He has clearly abstract ideas, for he knows that there is a quality as to which his lips, red flowers, and the sky at sunset agree. He can also understand and express propositions, and he can reason in a simple fashion. The language of deaf-mutes not only includes a play of feature and movements of the hands, but also the attitudes and movements of the whole body, and he can express himself by means of them spontaneously without education. His modes of expression by gestures follow a different order from that of spoken languages. Instead of saying, 'Do you go or stay?' the deaf-mute expresses himself, 'Stay, go, you?' Instead of saying, 'I go,' he makes the signs, 'Go, I.' For 'The man's arm is strong,' he substitutes, 'Arm, man, is, strong.'" He also tells us that deaf-and-dumb children of seven years of age, who have not been taught, use amongst themselves an astonishing quantity of rapid gestures, and they easily understand each other's meaning. It is, then, abundantly evident that a society of dumb men would soon elaborate a gesture-language of great complexity. A deaf-mute told Mr. G. J. Romanes that he

* In 1867. See Preyer, *loc. cit.*, p. 306.

always thought by means of mental images of hand-and-feature movements.

Language a consequence of thought.

It is plain, then, that rational conceptions, "abstract ideas," can exist without spoken words; but there is no evidence that they can continue to exist without some embodiment, some form of language, some corporeal expression, either by voice or by gesture. Language, therefore, is a *consequence* of thought, and abstract ideas are indispensable preliminaries of language. We see this in our common experience. When, in the cultivation of any science or art, newly observed facts or newly devised processes give rise to new conceptions, new terms are invented to give expression to such conceptions. Thus new words arise as a *consequent*, and not as an *antecedent*, of such intellectual action. New terms are always fitted to fresh ideas, and not fresh ideas to new terms. Whoever attentively follows the mental development of a child, will see that in it also notions are formed spontaneously; that they do not follow the acquisition of words, but, on the contrary, often give rise to them.

That language is dependent on thought, not thought on language, is demonstrated for us by the lightning-like rapidity—a rapidity far too great for words—with which our minds may detect a fallacy in an argument. This instantaneousness is not the mere mental ejaculation of the word "No;" for the mental act is not a blind one, but is uttered for a distinct *reason*, and is due to our instantly seeing the nature of a fallacy, it may be a whole chain of argument with its logical relations and consequences. The most rapid cry or gesture of negation is often, then, the sign of intellectual perceptions which would require more than one sentence fully to express, but which are perceived too rapidly for even the mental repetition of the words of such sentences.

Nevertheless, these intellectual perceptions show themselves by bodily signs—sounds or gestures—and even all our silent thought is carried on by the aid of some imagined bodily signs, without which, as we observed in the beginning of this chapter, we cannot think. Human language seems quite unable to grow, or even to endure,

without some embodiment, without corporeal expressions of some kind. Thus language, of word or gesture, is the necessary means of human thought, as well as its necessary consequence. The mental and bodily signs of language are so intimately united that, though the mental side is anterior, it at once seeks, as it were, to incarnate itself, and under normal conditions does incarnate itself, in corporeal expression. We have seen how deaf-mutes spontaneously evolve a gesture-language through which they can understand each other and communicate their ideas. Dr. W. W. Ireland,* cites an instance of a boy who could not speak ordinary words, and yet had invented a few of his own, to which he attached fixed meanings. Thus he said "Weep-oo" for night or black, "burly" for wood or for a carpenter, "tatteras" for soldiers, "hatts" for big or large, and so on. I myself knew an old lady of weak intellect who lived under the care of my deceased friend the naturalist, Charles Linnæus Martin. She also had invented an imperfect language of her own, coining strange words with very definite meanings, which she used frequently and adhered to with pertinacity. Dr. Bastian has recorded † a case (from his own experience) which seems to show that the faculty of rational speech is so implanted in us, potentially, from the first, that it tends to manifest itself spontaneously, and may do so very unexpectedly. He tells us that in the year 1877 he was consulted concerning the health of a boy twelve years old, and subject to fits at intervals. When five years old he had never spoken a word, and physicians were consulted about his "dumbness." Before the expiration of another twelve months, however, on the occasion of an accident happening to one of his favourite toys, he suddenly exclaimed, "What a pity!" though he had never previously spoken a single word. He was then again silent for two weeks, but thereafter speedily became most talkative. A more wonderful case was that of Laura Bridgman.‡ She was blind as well as deaf, and had half lost the power of smell, and yet learned to read and write and also

A tendency towards language seems innate.

* See his work on "Idiocy and Imbecility," p. 276. Churchill: 1877.

† "The Brain as an Organ of Mind," p. 606. Kegan Paul, Trench & Co.: 1880.

‡ "Idiocy and Imbecility," p. 225.

to apprehend abstract relations and quantities, and this though she lost her senses of sight and hearing, through scarlet fever, so early that she had no recollection of having had them. When Dr. Ireland first saw her she was six years old. The case of Meystre,* at Lausanne, born deaf and dumb, and who became blind through an accident when six years old, is even more remarkable. He learned to speak audibly, and acquired many ideas. His idea of God was that of "thought enthroned somewhere." Such cases as these seem to demonstrate the existence of wonderful innate intellectual capacities in the human mind. The facts of the growth and development of language show us that thought must be deeper, wider-reaching, and more perfect than its bodily signs, and therefore that language can only give imperfect expression to it. But for this, and for the facts that thought is anterior to speech, and that mental language has a greater range and perception than its bodily expression, the growth and development of language would be impossible. But if thought cannot continue to exist in us without some embodiment, much less can speech (apart from mere emotional language) exist without thought and without those complex intellectual actions of abstraction and the recognition of abstract ideas, which are its very life.

Roots, and the question of the origin of language.

Language has been shown to be reducible to a certain number of primitive terms, which have been distinguished as "roots." A large number of these denote different kinds of bodily activity. In consequence of this, a suggestion has been put forward that, in certain sounds accompanying such actions—sounds such as seamen and others often utter in common when working together—we have the first origin of all language.

It is admitted on all hands that spoken language could not arise except by the utterance of sounds, the meaning of which was simultaneously understood both by those who uttered them and by those who heard them. Speech requires an apprehending intelligence on the part of the hearer as well as on the part of the speaker, if it is to be more than a monologue; and we may consider it certain

* *Loc. cit.*, p. 231.

that speech would never have arisen had not two persons possessed the same idea at the same time. Now, it is true that a person performing, in the presence of others, any action (such, for example, as pounding with a stone) would know by consciousness what he was doing, and those around him would know through their senses what he was doing, and so a sound repeated by him in their presence while so acting might, it has been contended, generate a term to denote such action, which term would thus come to be understood both by him and by those about him.

But if any emitted sounds really constituted the origin of language by having existed before it, such sounds must have been at first devoid of any accompaniment of abstract conceptions. They must have afforded and constituted the occasion for the conjunction of thoughts with sounds. Words, however, are never now intelligently uttered except when the mind is already furnished with the mental abstraction to which such words refer. It would seem, therefore, that no man could ever have voluntarily and intentionally uttered a sound to denote an action unless he already possessed a mental conception, that is, an abstract idea, of that action; nor could bystanders have accepted and understood such demonstration unless they also already had the idea. Again, even if the man performing the supposed action be imagined to have at first uttered the sound accidentally, without will or intention, and then repeated it only by automatic habit, it is evident he could not come to understand or apply it subsequently except by first acquiring the idea or conception itself. A sound, articulate or not, and an abstract idea, are things utterly distinct in kind; and to suppose that the former could ever by itself generate the latter, is as absurd as to suppose that the waves of the sea could generate the vessels which float upon their surface.

The spoken word is most important and influential when once it has been introduced, but its introduction needs that reason should be already present. The doctrine that *speech begat reason* cannot be maintained, for speech cannot exist without the existence with it of that intellectual activity of which it is the outward expression. As

well might the concavities of a curved line be supposed to exist without its convexities, as the spoken word be supposed to have arisen prior to the idea which it represents. Experience shows us, as before observed, that, as a fact, words do not generate thoughts, but the very reverse. It is, of course, true that infants learn to speak words the meanings of which they do not understand; but, in the first place, they learn them from those who do understand them, and who make known to them by degrees their meaning; and, in the second place, we do not know how soon they annex meanings of some kind to the words they learn, while they often plainly indicate that they have meanings and knowledge of which they seek to convey, *before* they can speak. They exhibit, as we have seen, unmistakable signs of the spontaneous activity of the germinating intellect, as every father knows. Every father who cares to observe, may note with what facility his child forms "universals," often making use of words to indicate (as we have already pointed out) far more extensive classes of objects than they properly serve to denote. Such terms are certainly at first neither explicit universals nor explicit singulars, for the child has at first no such explicit notions. But it does not use infantine general terms to denote some individual objects, before it has in its mind a vague conception of a universal, and it soon employs the greatest of all universals when it speaks of a "thing."

We have seen that the mind of man is not dependent on speech for language, but, when it is necessary, can design and use a language of gesture—language as truly abstract and intellectual in its essence as that of the spoken word. Rational conceptions, therefore, can evidently exist without words, but rational words cannot exist without conceptions or abstract ideas. The intellect is the common root from which both thought and language (whether of speech or gesture) spring, and thenceforth continue and develop in inseparable union. It is therefore manifest that language and reason could never have originated from a practice of drawing the figures or outlines of objects. For such drawings are the equivalents of words, if not of propositions, and must have been preceded by abstract con-

ceptions. No one could draw a horse who had not even the idea of a horse. *Kinds of language*

Language, then—using that term in its widest possible sense—consists of two radically distinct kinds—the language of feeling,* and the language of the intellect. And there are three subdivisions of either kind. Of the mere language of the emotions and of feeling we may have—

(1) Sounds which are neither articulate nor rational, such as cries of pain, or the murmur of a mother to her infant.

(2) Sounds which are articulate but not rational, such as many oaths and exclamations, and the words of certain idiots who will repeat, without comprehending, every phrase they hear.

(3) Gestures which do not answer to rational conceptions, but are the bodily signs of pain or pleasure, of passion or emotion.

Of the language of the intellect we may have—

(1) Sounds which are rational but not articulate, such as the inarticulate ejaculations by which we sometimes express assent to or dissent from, given propositions.

(2) Sounds which are both rational and articulate, constituting true "speech."

(3) Gestures which give expression to rational conceptions, and are therefore "external" but not "oral" manifestations of abstract thought. Such are many of the gestures of deaf-mutes, who, being incapable of articulating words, have invented or acquired a true gesture-language.

Thus the essence of true, or intellectual, language is mental, and is intellectual activity—the *verbum mentale* or the "mental word"—while the external expression of thought may be distinguished as the *verbum oris*, or "spoken word;" and the latter ever follows the former, as is evident by the constant process of inventing fresh terms—which goes on in every science—in order to denote new or more complete and better-defined conceptions. *The mental and the spoken word.*

It is evident that a paralyzed man might have essentially the power of language (the "mental word"), though accidentally hindered from externally manifesting that

* See above, p. 196.

inner power by means of the "spoken word," or even by gestures. Normally, the external and internal powers exist inseparably. Once that the intellectual activity exists, it seeks external expression by symbols—verbal, manual, or what not—the voice or gesture-language. Some form of symbolic expression is, therefore, the necessary consequence in man of the possession of reason, while it is impossible that true speech can for a moment exist without the coexistence with it of that intellectual activity of which it is the outward expression.

We are now in a position to appreciate the force of the remark before made,* that a study of language proves that there is a most important fundamental difference between those various forms of feeling—activity, passivity, relation, etc.—described in our fourteenth chapter, and the corresponding intellectual perceptions. It has been asserted that the only real difference between such feelings and the corresponding ideas is due to the introduction of language, and is a mere affair of words being added to antecedent feelings. But it is now clear that no addition of mere words could effect such a transubstantiation as would be the change of feelings into ideas. This is clear because we have here seen that intellectual conceptions—abstract ideas—must be already possessed by and present in the mind before language can have any meaning. The existence of the mental word must ever precede that of the spoken word. The existence, therefore, of the former can never be due to the presence of the latter; and the various complex and wonderful varieties of feeling before described,† though they form the natural basis and sensuous supports of reason, are not and never can become reason itself. Logical in their essential relations they may be, but the logic of the intellect is of altogether another nature. The so-called "logic of feeling" is not truly logic, and is only so named by a remote analogy with the laws of thought, in which alone true logic really and formally exists.

* See above, p. 208. † See above, pp. 189–201.

CHAPTER XVII.

PERCEPTIONS OF TRUTH, GOODNESS, AND BEAUTY.

We apprehend truth, goodness, and beauty as objective attributes of things, which attributes answer to three corresponding ideas, most closely allied, but each ultimate and incapable of analysis.

These perceptions accompanied by corresponding feelings—Objectivity of truth—Material and formal truth—Truth a universal relation of conformity—Idea of number—Ideas of existence, essence, reality, possibility, necessity, and causation—Perception of goodness—Goodness an ultimate idea—Goodness universal; implies a relation—Material and formal goodness—Objectivity of goodness—Distinctness of moral perceptions from sentiments—The moral sense a higher instinct—Feeling for and perception of beauty—Beauty is perfection—Objectivity of beauty—Everything has beauty.

These perceptions accompanied by corresponding feelings

OUR perceptions of being and of power have been, perhaps, sufficiently adverted to; but our faculty of apprehending truth, goodness, and beauty is a faculty the study of which seems to us to be of such importance as to need separate treatment. These three distinct apprehensions are usually accompanied by corresponding sentiments or higher emotions,* which in turn repose respectively upon three of our sensuous faculties or lower mental powers.† As it is impossible for us to have any idea, however lofty, without the support of some sensuous imagination—a fact which introspection has shown us‡—so also our higher sentiments repose on and are sustained by corresponding lower feelings, which again are, in turn sustained, and ministered to by the nervous structures of our body.§

* See above, p. 221. † See above, pp. 193, 197.
‡ See above, p. 88.
§ As to the nervous system, see above, p. 150.

Our apprehension of truth has been sometimes said to be a mere subjective individual feeling—truth for each man being just what each man troweth, and no more. But the reader's common sense will, we are convinced, soon show him that truth really exists, at least as a quality of statements and beliefs. This is a fact which no man can really deny. For any sceptic who honestly affirms that truth has a merely subjective value, must, at the same time, thereby deny and refute his own affirmation. For if the statement, "Truth is merely an individual feeling," were, *in fact*, true, then that very statement itself—being "a fact"—would itself be an *objective* truth, and *more* than an individual feeling; so, at least in this instance, the sceptic must affirm that "Truth is not merely an individual feeling," *i.e.* he must refute himself. But, as before pointed out,* and as John Stuart Mill has affirmed,† the recognition of the truth of any judgment we make is not only an essential part, but the essential part, of it as a judgment. Leave that out, and it remains a mere play of thought, in which no judgment is passed. No follower of any branch of physical science, at any rate, can reasonably doubt that truth is more than a mere quality recognized as belonging to a judgment by him who emits it, and has a real relation to external things. Otherwise, it is plain that science could make no progress. We do not base scientific inductions and deductions on our knowledge of beliefs, but of facts; and, without a foundation of facts, beliefs are worthless. The independence and objectivity of truth should be especially manifest at a period in which the unconditional pursuit of truth is perhaps more eagerly engaged in than at any previous time, and when a profound reverence for truth is ardently professed by the leading men in each department of physical science, and is certainly in their lips no idle boast. The truth of physical science consists in the agreement of "thought" with "things;" of the world of "beliefs" with the world of "external‡ existences." Truth, then, cannot be only "what each man troweth," but must

Objectivity of truth.

* See above, p. 104.

† In his "Examination of Sir William Hamilton's Philosophy," p. 346.

‡ The reader may here recur to the illustration before given, p. 137.

be what a man troweth when he troweth in conformity with real external coexistences and sequences, and with the causes and conditions of the world about him. Truth, therefore, is and must be both subjective and objective. It is subjective, regarded as a quality of his thought by him who thinks it. It is objective, regarded as a quality of the thought of any one else. There is another form of truth called *moral truth*, which consists in a conformity between the words or gestures of a man, and the judgments and convictions of his mind. To make an assertion which is opposed to facts is, of course, to say what is not true; but such an assertion may be innocently made by mistake, and, if so made, it does not violate moral truth, and only constitutes what is called *material* untruth. To speak deliberately and intentionally in opposition to facts known to be such constitutes what we may distinguish as *formal* untruth.

Material and formal truth.

But can "truth" be attributed to things themselves apart from any assertions made or beliefs entertained about them? We often speak of "making a *false* note" in music, and of "*false* drawing" in a picture, or of a statue being "*true* to nature;" and we may praise a man for acting as "a *true* friend." These expressions refer to the existence or non-existence of a conformity between some object or action and the idea of such object or the intention which should accompany such action. Here, then, truth is also a relation of conformity between external realities and the mind. But, once more, can truth be attributed to things themselves apart from and independently of all and every human mind? The answer which a man will make to this question must depend upon his conviction respecting a first cause.* All those persons who are convinced of the reasonableness of Theism must affirm that truth can be so attributed. For if we may conceive what, for lack of a better name, we may call "intelligent purpose" as underlying nature, then each object, in so far as it corresponds with such intention, may with justice be spoken of as true. It is another, though widely different, conformity between thought and things—namely, their con-

Truth a universal relation of conformity.

* As to this question, see Sect. V. chap. xxvi.

formity with the thought which is Divine. "Truth," then, essentially expresses a relation of agreement between two distinct things. Nothing is or can be true in itself, but only in relation to something else with which it conforms. Truth is thus one kind of conformity, and the essence of all truth is likeness. If it be further asked, "What is conformity or agreement or likeness?" the only reply possible is that such words express an ultimate idea. The terms "likeness" and "unlikeness" are incapable of explanation. They express an idea as impossible to explain as to define because it is so simple. For to say, two things are alike when they are "at one," or "identical in some respect or other," does not deserve to be called an explanation. Any mind, then, which cannot understand the term "likeness," may regard the task of understanding any branch of knowledge, however elementary it may be, as altogether beyond its power. It is as evident that everything cannot be explained or defined, as that everything, as we pointed out in the beginning of this work,* cannot be proved. If nothing was ultimate, nothing could ever be explained or defined, but those processes would have to go on for ever.

A little reflection will also show the reader that a full apprehension of the idea "truth" involves that of some other highly abstract ideas. We have seen that certain objects are true when they so exist as to correspond with the essential idea they embody. Moreover, truth is one, while error is manifold. We may, for example, have many false descriptions of the law relating to the enfranchisement of copyholds, but there is only one account which can possibly correspond with the facts of the case. If, then, truth is really and essentially one, to understand the full meaning of that word we must more or less comprehend the meaning of the ideas "unity" (and therefore "plurality" and "number"), "existence," "essence," "reality," "necessity," and "possibility."

First, as to the ideas "unity" and "number": The idea of unity is one of the most simple of our ideas. It can be applied to all things, whether they are or are not perceptible

* See above, p. 9.

to the senses. It may be applied equally well to the bed we last slept in, and to the first thought we had on waking within it. Similarly, the idea of number can be applied universally to thoughts, contradictions, negations, and fictions, as well as to more positive things, and things which can be seen and handled. *Idea of number.*

The idea of number applies to the simultaneous as well as the successive. We may be able to say with equal truth that we have five sovereigns in our purse and that we have walked five miles. Nevertheless, a perception of number does not ordinarily arise except as a consequence of "succession"—of our perceiving things successively. For the recognition of two things as being of that number requires something more than their simple perception or imagination. They must be susceptible of comparison, and be recognized—at least implicitly—as belonging to some one class, so that they can be united under one common idea as a consequence of intellectual abstraction and comparison. No one, for example, could say that his kitchen chimney and Scott's conception of the character of Effie Deans were "two," unless he spoke of them as two things "thought of by him." By so doing he would unite them under a common idea, and could then say truly they were "two," namely, two thoughts of his. As it is with "two," so of course is it with all other numbers. They exist really in things as well as in the mind, which, we find by experience, has the power of recognizing objective conditions of number, unity and plurality in objects, and of forming corresponding subjective conceptions. The idea of any number, *e.g.* "five," is not the idea of the word (vocal sign) "five," since it corresponds not only equally well with the word whether spoken or written, but also with corresponding conventional gestures. But the idea itself is *not* conventional. It is the sign (oral or manual) adopted to express that idea, which is conventional. Of course, the same object may be "one," regarded from one point of view, and "many," regarded from another point of view; as in the familiar example of a regiment of soldiers.

But the idea of truth also necessarily implies the idea of "*existence*," since whatever is true must in some sense *Ideas of existence, essence,*

reality, possibility, necessity, and causation.

"be."* But we apprehend not only the truth of positively subsisting things,† but the truth of propositions, and distinguish between things which are actually and really true (as that Vesuvius is in Italy), and things which are real at the same time that they are ideal—as, for example, the beauty of Cordelia's character, or the image of the earth which would be formed in our eyes could we view it from the moon's surface. We sometimes recognize, also, that a given consequence *may* or *must* follow from some antecedent—as that sunset *must* occasion some degree of darkness, but *may* be accompanied with a glowing western sky. Of course, the truth of any proposition depends essentially on the agreement between the statement it conveys and the matter, actual or ideal, to which it relates. As, then, the "essence" of truth exists in this conformity, to fully understand truth, is to have some conception of "*essence*." "Essence" may thus be seen to signify "that, in the absence of which, a thing cannot be what it should be or is." The preceding examples of ideal truths may serve to show that the idea of *reality* does not necessarily imply actual existence; for, though nothing which actually exists can be "unreal," yet whatever may so exist, though as yet it does not, has a certain reality; that is to say, it is not purely imaginary. That men believe in the "reality" of the summer which has yet to come, is shown by their preparations for the crops it is expected to bring to perfection; as attention to warm clothing, shows how the reality of next winter is believed in by furriers, hosiers, and housewives.

The idea of *possibility* is included in the full meaning of "truth," because, if anything is "true," it cannot, by the law of contradiction, at the same time be "untrue. The law of contradiction we see to be "necessarily" true. But we cannot apprehend that anything is "necessary" without also comprehending the meaning of the opposite term "not necessary"—that is, "possible." We have a fourfold idea of possibility—intrinsic and extrinsic, physical and

* The idea of "being" has been already noticed (see above, p. 205).

† We have already observed how, in our intellectual perception of any object, there is contained an apprehension of its *subsistence*, as well as of its nature (see above, p. 211).

moral. A thing may be understood to be "possible" *intrinsically*, that is, in so far as there is no contradiction contained within it. It is thus intrinsically possible for a bird or beast to differ more or less in colour from its congeners; but it is not possible for a bird or beast to have gills instead of lungs. It is possible for a seemingly unkind act to be a proper return for a really kind one; but it is impossible for ingratitude to be a virtue. But a thing may be intrinsically, though not *extrinsically*, possible, that is to say, an object or action may be possible in itself, while there are no means and appliances to bring it about—as, for example, to throw a projectile from London to New York. A thing may be possible *physically* but not *morally*. Thus it is physically but not morally possible for all men to unite in telling the same lie.*

As to the idea of "*necessity*," we have long ago † recognized our apprehension of "necessary truth," and how a perception of the law of contradiction, that is of "absolute impossibility," is at the root of all our intellectual activity. Of course, an apprehension of "necessity" is, as it were, but the other side of our apprehension of "absolute impossibility"—since whatever cannot possibly fail to be, must of necessity exist. In these ideas of possibility and necessity, the *idea of causation* is involved. Of that intellectual conception we have already spoken,‡ as well as of those sensuous perceptions and feelings which are closely related to it.§

Perception of goodness.

Next after the perception of "truth," we may consider our perception of "*goodness*"—our ethical judgments as to "right" and "wrong." This higher faculty of ours must be carefully distinguished from mere feelings of sympathy, companionship, regretful emotions of a painful character, and feelings of shame. Such feelings we have already recognized ‖ as pertaining to the lower side of our nature, that is to say, as being distinct from—however frequently they may accompany—our intellectual perception of circumstances, either meriting our sympathy or properly exciting in us a feeling of shame. Perceptions of such

* See above, p. 61. † See above, chap. iv. p. 39.
‡ See above, p. 48. § See above, p. 195. ‖ See above, p. 186.

facts, and the feelings which may attend those perceptions, are evidently very different things.

The idea of "goodness" is, moreover, quite distinct from the ideas of "utility" or "pleasure." Not, of course, but that what is pleasurable may in one sense be called "good," as also things which are useful. But, as we shall see directly, the "goodness" of such things is not either in their pleasurableness or their utility. It resides in another property which is common both to things pleasurable or useful, and also to things "good," in the highest sense of that term.

When we call either a knife, a gun, a horse, or a coat, "good," we mean that it is well adapted to serve the purposes for which it was intended. We may use it similarly with respect to a race-horse, a baker, a judge, or a bishop. Nevertheless, a little consideration serves to show that this use of the term does not bring us to the foundation of the idea "goodness," and the same objection applies to the use of that term to denote anything which must give us pleasure. The "goodness" referred to in both these cases is "goodness of a certain order"—a relative goodness of a limited kind, and not "goodness" simply and absolutely. A useful thing is "good" because it has the "virtue" of "serving, or conforming to, some end or intention," and a pleasant thing is "good" because it has the virtue of occasioning pleasure, as will shortly be more distinctly pointed out. But neither "conformity to an end" nor the "elicitation of pleasure" is good absolutely,* unless the end aimed at and the pleasure enjoyed are also "good." The tool of a housebreaker will be good, as made of good materials, well put together, etc., and also as apt for its end; but it cannot be absolutely "good" regarded in the latter aspect—owing to its relation to the defective intention of the thief who is to use it. Neither can the pleasure which may be elicited by some act of cruelty be good. No object or action, pleasurable or otherwise, can be good simply, unless it tends to what is in itself good and "agreeable to duty"—unless through that object or action, we "follow the right order." To be "good," it must

* See below, p. 251.

somehow conduce to such a following of the right order. The action must be one whereby we follow that order, and the object must be something by the contemplation or other use of which, the right order tends to be followed. We may ask, "Why should we conform to duty? Why should we follow the right order?" To these questions the only possible answer is, "It is right so to do." It may, perhaps, be replied, "The right order should be followed because it is our interest to follow it." But any one so replying must mean either that it is always right to follow our interest because it is our "*interest*,"—and so abandon the idea of duty altogether; or else that "we should follow our interest, not because it is our interest, but because it is *right*,"—and so affirm the very ethical principle which he set out with the intention of denying. Evidently it is not a man's absolute duty always to follow his own interest, regardless of his fellow-men, and whatever the circumstances of the case may be. But if any one really followed his interest on that ground, *i.e.* because he thought it was his duty so to do, then he would follow it, not because it was his interest, but because he thought it was right.

Goodness an ultimate idea.

Every one will admit that "gratitude is a good thing," and gratitude certainly gives pleasure, promotes happiness, and conduces to prosperity. But the idea of its "goodness" is something different from the ideas "pleasure," "happiness," and "prosperity." The idea of a being who sacrifices all these excellent things in order to perform what he deems an act of duty, is the idea of a very good being, but not necessarily of a happy one.

The radical distinctness which exists between our idea "goodness," and every other conception, can be shown by the analysis of any ethical precept we may wish to select. Let us suppose, for example, that any one is told he "should pay his tailor," and the truth of the saying is disputed: how should we set about trying to convince him of its truth? Obviously, by putting forward some more elementary and general moral precept, which we anticipate will be assented to at once—such as "Every man is bound to pay his debts." If this is again disputed, we might further urge, "A man is bound to satisfy obligations he has

voluntarily incurred," and so on. In every step we make to explain why a duty should be performed, there must always be a further and more elementary declaration of duty, until we come to some assertion of the kind the truth of which is admitted as self-evident. In other words, we cannot prove any truths concerning duty by appealing to considerations into which the idea of duty does not enter. All our knowledge, as we have seen,* is either self-evident or is legitimately deduced from what is self-evident; and this, of course, applies to our idea of right and wrong, as well as to all the rest of our knowledge. Now, if we see that some definite line of action is certainly "right," the proposition which declares it to be right must either be self-evident or must be deduced from other propositions as to what is right, one of which at least must be self-evident; or else we can have no basis whatever for our knowledge as to what is right or wrong. In other words, the general propositions which lie at the root of any ethical system must themselves be ethical.† This truth cuts the ground from under—renders simply impossible—the view that a judgment as to moral obligation can ever be, or could ever have been, developed from mere likings or dislikings, or from feelings of sympathy, companionship, and those pleasurable and painful feelings which may be occasioned by the goodwill or hostility of our fellow-men.

Those persons who, while affirming moral precepts, deny the essential distinctness of our idea of goodness, can always be refuted by an analysis of the precepts they maintain. Such an analysis will suffice to show how they implicitly contradict themselves. We are not likely, however, again to meet with so amusing and instructive an example of such contradiction as the one which the late John Stuart Mill has supplied us with. That eminent denier of the essential distinctness of virtue and upholder of utilitarian principles, once wrote as follows:‡ "If I am informed that the world is ruled by a being whose attributes are infinite, but what they are we cannot learn, nor what

* See above, p. 14.
† As pointed out by Mr. Arthur Balfour.
‡ See his "Examination of Sir William Hamilton's Philosophy," p. 103.

are the principles of his government, except that 'the highest human morality which we are capable of conceiving' does not sanction them; convince me of it, and I will bear my fate as I may. But when I am told that I must believe this, and at the same time call this being by the names which express and affirm the highest human morality, I say in plain terms that I will not. Whatever power such a being may have over me, there is one thing which he shall not do—he shall not compel me to worship him. I will call no being good who is not what I mean when I apply that epithet to my fellow-creatures; and if such a being can sentence me to hell for not so calling him, to hell I will go."

In saying this, Mill only says what every right-minded man should say. Admirable, however, as is his declaration, it is singularly inconsistent in the mouth of a professed utilitarian. For if actions are "good" or "bad" merely according to the pleasure or pain which may follow them, then, if by flattering a bad god we could all secure a maximum of pleasure while otherwise we should all incur endless torment, then certainly, on utilitarian principles (not, of course, on the principles we defend), such flattery would be good. Mill's position is indeed a curious one; for he must mean that, in the matter in question, all men would do well to act with him. He, in effect, then, affirms that to attain the greatest possible happiness for all, is the aim men should pursue, and also that in its pursuit they may accept the greatest possible amount of final, universal misery! Malebranche has expressed * himself to the same effect as Mill, except as regards its inconsistency.

Our perception of the character of goodness, is the perception of something ultimate and not dependent even on the will of any Divine Being. There have been persons who maintained the contrary of this, and who have said, not only: "that is right which God commands," but also "it is right *because* He commands it." But in our perceptions of duty and moral obligation, we recognize the fact that it addresses conscience with an essentially absolute and unconditional imperativeness. No good man

* See below, chap. xxvi.

could consent to perform a really ungrateful or cruel action, seen by him to be such, even in obedience to the behests of an Omnipotent Being. We must, therefore, approve and admire Mill's declaration, above cited, however much we may distrust our own powers of even enduring a temporal martyrdom. But if "goodness" cannot be dependent even on the will of God; if the commands of conscience are absolute and supreme; if it is impossible even to conceive of a lawful evasion of its universal and unconditional authority; then the ethical principle must be rooted, as it were, within the inmost heart, the very foundation, so to speak, of the great whole of existence it pervades. The principles of the moral law must be at least as extensive and enduring as are those starry heavens which shared with it the profound reverence of Kant. Moral truth is universal, necessary, self-evident, ultimate, and primary, and belongs to the category of necessary truth, which we examined in our first and fourth chapters.* It exists, therefore, objectively, and is not dependent upon the human mind.

Goodness universal; implies a relation.

Moreover, as we saw before† that all persons who believe that a Divine intention is expressed in nature must affirm everything to be "true" in so far as it corresponds with that intention, so it must also be with respect to "goodness." Every object or action, in so far as it exists and so follows the law of its being, must be more or less "good." If by defect it deviates from a higher good, it thereby becomes a more or less good thing of an inferior order—as a marble statue broken into fragments ceases to be good as a statue, and becomes so many pieces of marble, "good" in their degree and apt for various inferior ends.

Thus the idea of "goodness," like that of "truth," essentially implies a relation. As nothing can be true save by its conformity or likeness to something else, so nothing within our powers of observation and imagination can be "good" save by its harmony with an eternal, absolute law, by concordance with which it "follows the right order." Evil, therefore, cannot be perceived by us to have any absolute, positive existence, but appears to be merely negative

* See above, pp. 12, 38.

† See above, p. 239.

—only a certain degree of relative deficiency of existence or deficiency of correspondence with ideal goodness, on the part of some existing thing.

Material and formal goodness.

The goodness of actions is manifestly twofold—they may be "good" in themselves, or "good" as being done with a good intention by those who perform them. These two meanings of the term may be distinguished in the same way as we have already * distinguished the analogous distinction between the two meanings of the word "truth," namely, as *material* and *formal*. True goodness—that which contains the essence of the idea—is what is *formally* (or absolutely) good; *i.e.* good in intention as well as in its consequences. The other kind—goodness which is only *material*—regards the effects of an action, and not the intention with which it is performed. Thus, let us suppose that a certain man, Smith, who has an attractive daughter, asks Brown, whom he has greatly obliged, to introduce his daughter to a career he thinks will be greatly for her advantage. Let us suppose, further, that Brown, being a very malicious man, mistakenly supposes the introduction will injure the girl, and therefore complies with the request, but in so doing really benefits her. Brown's action is, then, "materially" good, because of its actually good effects, but "formally" it is a very wicked action. Had Brown's intention been really benevolent, his action would then have been both materially and formally good. Neither the giving of pleasure to Smith, or to his daughter, or to himself, will make Brown's malevolent action a good one; nor would the giving pain to Smith, to his daughter, or to himself, have prevented a refusal on Brown's part from being formally good, when he thought the desired introduction would be really injurious to the girl. Thus acts may be *materially* moral or immoral in a very high degree, without being in the least *formally* so. A sick man may be nursed with scrupulous care and exactness by some one who thereby greatly benefits him, but who all the time is animated by the hope and expectation of a good legacy. A man may, in the dark, shoot his own father, taking him to be an assassin, and so commit what is "materially" an act of

* See above, p. 239.

parricide, though "formally" it is only an act of self-defence, perhaps done with blameworthy rashness. A woman may innocently marry a man who, unknown to her, has a wife already, and so commit a "material" act of adultery. She may discover the facts, and persist in living with him, and so make her act a "formal" one.

It has been objected to this distinction that by it we exaggerate the importance of consciousness, seeing that "the most beautiful character to which a man can attain is that of doing good immediately and spontaneously, without thinking about it; not that of balancing and weighing and only acting after more or less doubt and hesitation." According to this distinction, it is urged, a covetous man, almost a thief, but who manages reluctantly just to escape actual dishonesty, is superior to a man who feels no temptation, but acts justly without a thought. The question of ethical "feeling" we will consider further on; but we would now point out that the essence of the objection just stated is a denial of the supreme merit of a good "intention," which, of course, cannot exist without conscious thought. But it cannot be really meant that it is the "absence of thought" which causes the beauty of a spontaneous moral action. Otherwise, were we to perform beneficial actions in our sleep we should thereby attain this climax of moral beauty. The "not thinking about it," therefore, is not that which makes the supposed action beautiful. Its beauty consists in its being the outcome and result of a habit of mind which has been acquired and strengthened by many antecedent good actions. A man could not get himself into such a condition of habitual readiness to do what is right, without previous voluntary acts in which he has discriminated right from wrong. A man cannot love justice without being able to distinguish it from injustice, and to love "moral beauty" he must know it. The idea of good which the man has in the past apprehended, must be influencing him at the time of his supposed action, whether he adverts to it or not; otherwise the action is not a virtuous one. The merit of the virtue which shows itself in even the spontaneous, indeliberate action of a good man, results from the fact of previous acts of his having

been consciously directed to goodness, and a habit having been thus formed. The more thoroughly a man is possessed by the idea of duty, the more his whole being is saturated with that idea, the more will goodness show itself in all his even spontaneous actions, which thus will have additional merit from their very spontaneity.

Objectivity of goodness.

Thus "goodness," like "truth," is both subjective and objective. It is subjective when regarded as a quality of the mind of any one conscious of a good intention. It is objective, regarded as that quality of an object, action, or intention, whereby it conforms in its degree to that eternal law of right which manifests itself to our intellect as inherent in the universe as we know it by observation, reasoning, and consciousness, our consciousness showing it to be inherent in our very selves.

Reverting to the distinction, which we before briefly considered,* between our ideas of things "good" and things "useful," it may be further observed that "virtue" and "utility" are ideas not only fundamentally distinct, but so far in natural opposition that the existence of utility in an action may now and again detract from its virtue. So essential is the distinction that not only does the idea of "benefit" not enter into the idea of "duty," but we even see that the very fact of an act not being beneficial to us may make it the more praiseworthy. Its merit is increased by any self-denial which may be necessary to its performance, while gain tends to diminish the merit of an action. It is not that the absence of gain or pleasure, benefits our neighbour more; it is that any diminution of pleasure which circumstances may occasion, irrespective of any advantage thereby occasioned to our neighbour, in itself heightens the value of the action. That, therefore, cannot be the substance of "duty" which increases "dutifulness" by its absence.

The conception of duty is the conception of something supreme and absolutely incumbent upon us without appeal, apart from any question of pleasures or pains, rewards or punishments. Cicero has well characterized it as "*Quod tale est ut detracta omni utilitate sive ullis præmiis fructibusque perseipsum possit jure laudari.*"

* See above, p. 244.

We rarely advert to abstract conceptions of right and wrong, but we apprehend very frequently that of two modes of action, one is higher, nobler, and superior morally to the other. We appreciate the good, bad, or indifferent character of actions taking place under given circumstances. We do not say, however, that men always coincide in their views as to the moral character of any given action, or that the same man will estimate its ethical value in the same way at different periods of his life. What is here contended for is the absolutely distinct nature and character of that quality which we attribute to any action when we call it "good." Varieties of view as to the ethical character of different particular acts will come under our notice in our nineteenth chapter,* which will be devoted to a consideration of mankind, and, amongst other matters, to their ethical judgments. There is one fact which it is most desirable to recognize clearly—that is, the distinctness which exists between our ethical judgments and any sentiments we may feel respecting our own actions or those of other people. Feelings, emotions, and sentiments, pleasurable or painful, frequently do and always should accompany our perceptions of, or judgments about, good or bad actions. That such feelings, however, are very different from the perceptions or judgments themselves, a very little consideration will suffice to show. Thus our own consciousness and the observation of other men, will suffice to assure us that some pleasurable or painful sentiments of the kind may be felt about matters which we see clearly have nothing to do with right or wrong. Some trifling breach of etiquette or some innocent violation of social usage may call up a blush and feeling of shame far more vivid and distressing than what may attend some considerable moral delinquency. Keen remorse also may be felt for the neglect of some happy occasion for augmenting, by a polite attention, the goodwill of an influential acquaintance. Indeed, it is only too possible that such remorse may be felt for having neglected the opportunity of committing a very pleasurable but very wicked act. A French writer has said that no regret is so keen as the regret which may be

Distinctness of moral perceptions from sentiments.

* See below, p. 282.

felt for the non-commission of pleasant sins which might have been enjoyed. It has been said that "conscience" is that feeling of regretful dissatisfaction which is induced in a man who looks back and judges a past action with disapproval. Now, "conscience" certainly "looks back and judges," but not all that "looks back and judges" is "conscience." A judgment of conscience is one of a particular kind, namely, a judgment according to the standard of moral worth. But for this, a gourmand suffering after dinner from dyspepsia, might exercise his conscience in looking back and judging with "regretful dissatisfaction" that he had eaten the wrong sauce! A regretful sentiment of dissatisfaction thus can clearly exist when we make no moral judgment. Such a sentiment may exist in the mind of a vegetarian who has broken his rule, and who may reasonably feel vexation at his own infirmity of purpose; but such a feeling is quite different from the perception that he has done an act morally wrong, as in the case of a man who felt bound in conscience by the religion he followed to abstain from animal food.

The painful feeling of having incurred the dislike or disapprobation of our fellow-men, may also exist apart from a belief that we have committed any wrong. If this were not the case, how could we ask, as we may and sometimes do ask, whether society in certain cases is "right" or "wrong"? How could we ask, as we do, why we should obey society at all? We demand, and rightly demand, a rational basis for social claims. Those claims, then, or a feeling of deference to public opinion, cannot be the basis of morality. If it were that basis, then courage must have come to be regarded as supremely good, and cowardice as deserving of the deepest moral condemnation. And yet what is the fact? A coward probably feels self-contempt, and also that he has incurred the contempt of his associates, but he does not judge that he is "wicked." We despise, avoid, or hate a coward; but we know that his cowardice may be due to defective organization, and we can clearly understand that it is possible for a coward to be more virtuous than some other man who is conspicuous for courage. Feelings induced by recollections or anticipations

of punishment are also very different from moral judgments, as is abundantly evident from the many men, of very different views, who have nevertheless agreed in willingness to undergo suffering for conscience' sake. Many men also see clearly the moral turpitude of their habitual acts without any dislike of, or disposition to punish, the companions of their vices; rather the contrary.

Pleasurable or painful feelings having a certain resemblance to moral sentiments, may accompany perceptions which plainly have nothing to do with "right" and "wrong;" while distinct ethical perceptions may not be accompanied by appropriate feelings. The case is stronger even than this: the apprehension, through ear or eye, of very evil actions, may give rise to keenly pleasurable feelings, while moral truths may be both clearly seen and hated. To a trifling degree this is by no means rare. It is unfortunately common enough to feel that some duty is irksome and distasteful. Nevertheless, the idea of goodness is generally accompanied by a feeling of complacency.* In a perfect nature, what is virtuous is pleasurable; but in an imperfect nature it may be more or less painful. "Moral feeling"—the "moral sense"—is a sort of rational instinct. It is an instinct of our higher nature, parallel with, but entirely distinct from, the instinct of our lower mental powers before noticed.† Its existence is necessary to form a perfect man. To be ethically complete, our sympathies and aversions, our pleasurable satisfaction and our regretful dissatisfation, should respectively accompany our ethical perceptions of right and wrong—our judgments of moral approbation and the reverse. The reader can judge by this, on examining his own feelings, how far he approximates to or departs from this standard of moral perfection. Our reason judging as to right and wrong is "conscience," which often plainly tells which of two alternative actions is the higher, and which we ought therefore to follow. But introspection does not show us that we possess any other ethical faculties than those of (1) reason so judging, and (2) that moral sentiment which may or may not accompany such judgments. The subject will be further adverted to in the

The moral sense a higher instinct.

* See above, p. 222. † See above, p. 184.

final chapter of this section, when we come to speak of the moral phenomena which are common to mankind.

Feeling for and perception of beauty.

The third and last perception we have now to consider is that of beauty.

We have already seen, when considering our lower mental powers,* that we possess feelings of liking for certain sights, sounds, etc.—feelings of "taste," which vary greatly in different individuals. We also, in addition to these feelings, make distinct judgments about the beauty of objects which are to our taste or the reverse. That tastes differ is a proverbial truth, as also that it is useless to dispute about them. What we have a liking for, we do like, however much we may be blamed, despised, or envied for liking it. If a man really prefers Etty to Raphael, or Rigoletto to Lohengrin, no amount of reasoning or animadversion can do more than make him feign the contrary. Tastes also not only differ from individual to individual, but our own taste in early life is often not the same as that of later years. May it not be said, then, that beauty is but a matter of individual fancy and purely subjective, and the existence of any positive, absolute, objective beauty, a mere dream of more or less poetical minds? Whatever may be the true answer to this question, we must at least concede that we have somehow or other got the idea of beauty. However obtained, we have come to possess that abstract idea which, like all ideas, is profoundly distinct from any corresponding feeling. To feel attracted towards objects is one thing; to have a conception of their beauty is another and very different thing, and is an act of our higher or intellectual mental power. The faculty of apprehending beauty is also a power which may be greatly increased by culture. For the beauty of a Nocturne by Chopin, or of a landscape by Turner, the average boor has, as we say, "no ears or eyes." If the reader has, by chance, studied architecture, he can recognize that the knowledge so obtained has opened up to him perceptions of beauty which would otherwise have escaped him. Similarly, if he has studied zoology, he may have become awakened to the beauty of animals — serpents or what not — to the charms of which he was previously insensible.

* See above, p. 197.

If we recall to mind the conclusions at which we arrived with respect to our ideas of "truth" and "goodness," we shall thereby be greatly helped in arriving at a conclusion with respect to the objective nature of "beauty." As just said, we do actually possess the ideas "beauty" and "the beautiful," whatever may be the mode in which we have come by them. Let us, then, briefly consider some of those objects which are generally regarded as possessing some beauty and charm. Taking visible beauty as a starting-point, the objects which manifest it to us are sea, land, and sky, as viewed by night and by day, the animal and vegetable products of the earth, man and his works. The aspects of these objects change for us according to circumstances, amongst which must be reckoned the emotions or ideas which may happen to be the most vivid at different times. Nevertheless, whatever strikes us as pre-eminently beautiful is generally regarded by us as approaching perfection of its kind. No object which conveys to our minds a conception of discord, deficiency, or redundance amongst its parts or attributes, is considered by us to be supremely beautiful. Beauty, as apprehended by our ear, is eminently a harmony, and is the more beautiful according as that harmony approaches perfection. The beauty of even single musical notes is, we now know, due to *timbre*, which is a special and, as it were, minute kind of harmony. The same thing may be said of the charm of certain human voices, though they may possess the additional charm of perfectly expressing some shade of character or some dominant emotion. The senses of taste and smell may give us very pleasant impressions, which so far may be said to possess a certain kind of beauty; but it is only when objects convey to us the notion of a more or less harmonious and perfect blending of savours and odours, or of these combined, that they can ordinarily give rise to any idea of the kind. The sense of touch, combined with feelings of muscular effort and tension, may inform us of various beauties which are ordinarily apprehended by the eye; and this is emphatically the case with the blind. Feelings such as those of a most excellently polished surface, or of a perfection of delicate softness like that

Beauty is perfection.

of the fur of the chinchilla, may give rise to qualitative perceptions which we express by the terms "beautifully smooth" or "beautifully soft." But, apart from sensuous perceptions, our intellect can keenly apprehend "moral beauty"—the beauty of some human characters and actions. The characters and actions in which such beauty is most apparent to us, are just those which are deemed by us as most nearly approaching our notions of perfection. The same may be said of the intellectual beauty of a discourse, a poem, or a problem. Whichever of such things may strike us as being most beautiful, is that which most nearly agrees with our idea of perfection according to its kind. It would seem, then, that our intellectual apprehension of beauty, is a perception of ideal perfection realized to a greater or less extent. For, however great our admiration of anything may be, we can mostly conceive of an ideal beauty still greater. Thus the idea of "beauty," like the idea of "truth" and "goodness," though aroused within us through the impressions made on our senses by external objects, is not limited to or by them. Like the rest of the apprehensions of our higher mental powers, our perception of beauty, though attained through our sensitivity, is altogether beyond sensitivity—like the ideas of being, possibility, necessity, and cause. Now, just as we saw that objectors might ask us, "What is agreement or likeness?"* or "What is the good of following the right order?" so another inquirer may ask, "What is the beauty of perfection?" But here, as in the former instances, no reply can be given but that perfection is beautiful. If any one does not see the beauty of perfection, he is like a man who does not see the good of goodness, or who cannot understand the ideas "likeness" or "agreement." The idea of "perfect beauty," like the ideas "goodness" and "truth," is an ultimate idea, which is capable of apprehension, but not of analysis.

Objectivity of beauty.

Beauty also, like goodness and truth, exists, not only in the mind, but in the things the mind perceives. It is both subjective and objective. It is subjective regarded as a quality perceived by our mind; and objective regarded

* See above, p. 240.

as an intrinsic quality of an object whereby that object approximates to perfection according to the kind and sort of thing it is.

Beauty absolute, not relative.

But there is one great difference whereby "beauty" differs from both "truth" and "goodness." The latter qualities are, as we have seen, attributed to objects expressly on account of the relations such objects bear to something else; but "beauty" is essentially intrinsic, and relates, at least primarily, to a thing considered in and by itself. Nevertheless, the beauty of any object consists in a harmony of at least its internal relations. Nothing which was absolutely a unity, without either internal or external relations (if such an existence could be conceived of), could be said to possess beauty. As to external relations, when anything is said to be beautiful on account of its fitness to serve some end, the word is used analogically, since what is really meant is that it is admirable for its utility. It is a parallel case to the analogical use of the term "goodness"* to denote that a thing is good in a certain way—as "good" to eat.

Different kinds of beauty are often related to utility, but it is not the utility, but the perfection with which an object corresponds with a certain ideal wherein the idea of utility enters, which makes them beautiful. Nevertheless, an object may be said to have a relative beauty in so far as it augments, or is augmented by, the beauty of some other object. Thus a picturesque castle may derive additional beauty from its situation on some mountain side or top; or a mountain may derive an added beauty from a castle which clings to its steep sides or is artistically perched upon its summit. This relativity of beauty is an accidental relativity, since beauty does not, like truth and goodness, essentially imply relations, save internal relations. Can we form any conception of objective beauty altogether apart from human perceptions? If the beauty of anything consists in its perfection, then evidently—as we saw before with respect to truth † and goodness ‡—those who are theists, who are convinced that there is an Eternal Cause, the Author of all things, with their powers and perfections,

* See above, p. 244. † See above, p. 239. ‡ See above, p. 248.

must be able so to do. They cannot regard the Author of all perfection as Himself imperfect. Thus the ideas "truth," "goodness," and "beauty" are closely interrelated, though not identical. For that which is most good must, we see, be perfect of its kind, and therefore true; that which is perfect must be good and must also be true, as responding to the end of its being; and that which is true must be perfect in the way just mentioned, and therefore good.

Everything has beauty.

Since everything which exists more or less approaches a perfection of some kind or order of existence, everything must not only be more or less good and true, but also have a beauty of its kind and in its degree. But if everything is thus more or less beautiful, wherein does ugliness consist? Evidently it can have no positive existence, and can, like evil, be but a defect and negation, as "coldness" is but a deficiency of "warmth." Therefore nothing can be simply ugly in itself, but only in relation to something else. For as one thing may, as we have seen, gain beauty by augmenting the beauty of another thing, so a thing which is even perfect of its kind, and therefore beautiful in its degree, may be relatively ugly through the injury it inflicts or the destruction it occasions to the beauty of something of a nobler and higher kind which it, by its existence, deforms from perfection and tends to destroy. There are objects which develop themselves perfectly according to their own laws, but which, by their development, destroy human life. A biologist and a pathologist may appreciate the inferior perfection of this kind possessed by an object (some diseased growth), which is none the less relatively hideous as marring the beauty of a human body or even occasioning the moral deterioration of a mind.

It is impossible to avoid sentiments of distaste or horror at many objects, owing to our feelings as men; but our reason ought, at the same time, to teach us to make a due allowance, in our attempts to estimate the objective beauty of objects, for the prejudices which may result from our tendency to regard objects from an exclusively human point of view. Many such prejudices are induced from what we have been taught as children, and others are

probably inherited or at least attend us from our earliest years. There are persons whose reason, though they are perfectly sane, is quite unable to overcome a strong feeling of aversion to some harmless object, such as a cat or a mouse. Prejudices of the kind are also sometimes due to an association of painful feelings with the idea of any object which may have occasioned us severe loss or acute suffering. The perception of beauty is an intellectual exercise of one of our higher mental powers, but, as we have seen, even the most abstract conceptions cannot be present to our minds without being accompanied by some sensuous feeling or some imagination, while—since it is the same man who both thinks and feels—a dim intellectual consciousness of self-existence and of such ideas as "being," "truth," and "causation," accompanies mere sense-perceptions and the commonest bodily actions. These considerations will go far to account for differences of taste. They will similarly account for the mixing up with our intellectual perceptions of beauty, sensuous likings which may be keenly or slightly felt, but which mar the distinctness of the intellectual character of those perceptions. The same intimate connection between our higher and lower mental faculties seems to account for our tendency to admire, more than they merit, some things which please our senses, however little we may allow them to be of any high order of beauty when our judgment is fully exercised in their regard.

Those persons who may be inclined to wonder that so many men should admire things of very inferior beauty, and feel an attraction for objects and actions repulsive to more refined minds, should recollect that everything has a certain amount of beauty. As these men always seek a good, since everything has some goodness,* though not by any means the highest good, so whatever attracts them attracts them by a beauty of some kind, even though, by yielding to its attraction, they may be diverted from seeking a far nobler and higher beauty. As it is impossible to deny that even the lowest "goods" are "good" in their degree, so the lowest forms of beauty are beautiful after

* See above, p. 248.

all, and must exercise their charm on those who happen to be blind to beauties more objectively attractive.

The question how it is that men should be able to turn away from their very chosen ideal, to follow what even in their eyes is immeasurably less lovely, is the same as that which demands the reason why they should so often diverge from what they clearly perceive to be "the right order." This question is the question of our power of will, to a consideration of which the next chapter is devoted.

CHAPTER XVIII.

THE WILL.

Our power of deliberate attention is closely connected with our power of will, and our conscious experience assures us that we are not automata, but have an occasional power of free volition, the existence of which is implied in our ethical perceptions.

Conscious attention—The faculty of will is the Self, willing—Hypothesis of automatism—It conflicts with our experience—Conscious volition—Motives—Two verbal ambiguities—What consciousness does and does not declare as to our free-will—An objection—Free-will and morality.

Conscious attention.

IN the last chapter we recognized the fact that we have the power of perceiving that some acts are right and others wrong, and to distinguish between duty, utility, and pleasure. Another most important and significant fact, of which we may become assured by looking into our own minds, is the fact that we have a power of fixing our attention for a longer or shorter time on some object we have determined to examine.

By this "attention" is meant an intentional, deliberate, self-conscious act, and not that merely sensuous, automatic "attention" which was before noticed * in connection with our other lower mental powers. The distinction here referred to has been well drawn out by the late Dr. Carpenter,† as follows: "*Active* as compared with *passive* recipiency—*attention* as compared with mere *insouciance* —may be either *volitional* or *automatic;* that is, it may be either *intentionally* induced by an act of the will, or it

* See above, p. 198. † "Mental Physiology," p. 132.

may be produced *unintentionally* by the powerful *attraction* which the *object* (whether external or internal) has for the eye. Hence, when we fix our attention on a particular object by a determinate act of our own, the *strength of the effort* required to do so is greater in proportion to the *attraction of some other* object. Thus the student who is earnestly endeavouring to comprehend a passage in 'Prometheus,' or to solve a mathematical problem, may have his attention grievously distracted by the sound of a neighbouring piano, which will make him think of the fair one who is playing it, or of the beloved object with whom he last waltzed to the same measure. Here the will may do its very utmost to keep the attention fixed, and may yet be overmastered by an involuntary attraction too potent for it; just as if a powerful electro-magnet were to snatch from our hands a piece of iron which we do our very utmost to retain within our grasp."

Closely connected with this fact of active "attention" is the faculty of choice and volition, of which we are all conscious. Here it may be well to remind* the reader that, in speaking of our "faculty" of will, it is not, of course, meant to imply that the intellect has distinct parts or regions, but only that its power and energy may be turned in different directions. Much difficulty is sometimes occasioned by speaking of one's "will" as if it was something distinct from one's self—as if one could not act directly one's self, but that a sort of machine, "the will," was required, by means of which one acted. But our consciousness does not tell us that we have a "will" in this sense; it simply tells us of our doing as we will. The term "mental faculty" is, then, but a convenient mode of denoting one set of actions. If memory is nothing more than the intellectual self, remembering; the understanding is the same intellectual self, in the act of comprehending; and the will is the same self, willing; it is one of our many mental powers, and nothing more. It is no wonder, then, that we cannot perceive our free-will *in itself* directly, because, as we have already recognized,† we cannot directly perceive our own substantial and continuous being *in itself*

The faculty of will is the Self, willing.

* See above, p. 202. † See above, p. 19.

and apart from its acts or states, or our acts or states in *themselves* apart from our substantial being. Just as we cannot exist except in some active or passive state, so our will cannot exist except in activity or in a state ready to act. No wonder, then, that it cannot be otherwise known. But because we cannot see the will down to its root acting as a cause, it no more follows that its existence is doubtful, than the fact of our not seeing our own substantial and continuous self apart from its states, affords us a reason for doubting our own existence. Now, just as our own consciousness tells us that we are continuously existing beings, so our own consciousness tells us not only that we exercise a power of choice, but also that we occasionally so exercise it as to follow a course which tempts us less strongly than some other causes of conduct tempts us. We are conscious of acts of will of two different kinds—(1) acts of will in which we simply follow—consciously, but without any election or deliberate choice—the result of the attractions and repulsions acting on us, and (2) acts of will by which, after full deliberation, we elect to follow a course opposed to that to which the balance of the attractions and repulsions acting on us would naturally lead us, and so make an anti-impulsive effort. It is an unquestionable fact that men believe they have this double power of will, for all languages express such belief by terms of moral reprobation or approval. When a man has notoriously lost his power of self-control and become a mere automaton, dominated by external and internal attractions and repulsions, we say that he is not "an accountable being."

Hypothesis of automatism.

There are some people, however, who contend that we are all of us automata, and have no real power whatever of initiation or control, however the consciousness which attends most of our actions may delude us into the belief that we really have, at least occasionally, a power of will and free initiation, undominated by the action upon us of environing circumstances and agencies. They say, and very truly, that some physical cause precedes all our bodily motions, and that our every motion produces in turn physical effects; that some of these actions are attended by sensa-

tion, and that a smaller number are accompanied by consciousness; but they go on to add that all our feelings and thoughts are nothing more than accompaniments of such actions, and never themselves intervene in the circle of physical activities. They compare our thought and feeling to the luminosity which may manifest itself in a wire heated by the passage of electricity through it. As such luminosity accompanies the electric current, but forms no part of it, so, they say, feeling and thought may be aroused by certain conditions of a physical circuit of motion without affecting any part of that circuit. They deny that we ever originate anything or can do so, and affirm themselves (and us) to be the mere helpless spectators of a play of energies, some of which we are foolish enough to allow ourselves to be cheated into taking for our own spontaneous activity. "It would be incompatible," they urge, "with everything we know of brain-action to suppose that the physical chain of events ends abruptly in a physical void, occupied by something immaterial, which works alone and so affects the other edge of the physical break—two shores of the material bounding the immaterial."

Now, in considering this question, our supreme criterion must (as in other cases) be what consciousness tells us about ourselves, checked by observations and reasonings concerning the world around us. Our ultimate appeal must be made to our consciousness thus informed. But in the first place, does reason tell us that even mere feelings—our lower mental powers only—do not act as causes in the circle of physical causation? No doubt in reverie and sleep-walking the body is so far like a machine that it acts mechanically and necessarily; its actions being necessarily determined by the arrangements and adjustments of its various parts and organs. Yet its actions on these occasions do not take place without feelings, and these feelings are not the mere accompaniments of bodily actions, but are themselves guides and directing agencies which affect and operate upon, though they do not break through, the circle of bodily actions. The feeling of the handle of a door or the sight of a flight of stairs may change the course of action which the somnambulist was

pursuing. But the movements of the sleep-walker are also determined by a multitude of organic influences which are not felt (though they operate through the nervous system), but which nevertheless form part of a chain of immaterial changes or activities which accompanies the chain of physical modifications enduring throughout life. As we have seen,* our nervous system ministers to a vast number of bodily actions which are unfelt, as well as to felt actions, while other actions, which the nervous system does not and cannot control, form part of the great total of our bodily activity. Such are the actions within the nervous system itself, and the changes which take place in the ultimate substance or parenchyma of the body, beyond the reach of the most delicate nerves. Some of these actions, we know by our own conscious experience, are felt actions—the subjective and immaterial phenomenon (feeling) taking place simultaneously with the physical (bodily) changes.

Now, it is simply undeniable that the other nerve-actions, which are not felt, may have their immaterial and quasi-subjective sides also. It seems to us probable that such is the case, and we may hereafter find, when considering the matter from the scientific point of view, that this probability rises to certainty. Indeed, we may so far anticipate what we shall have to say later on, as at once to make the following observation with regard to the motions or actions of any body whatever: The matter of that body is one thing, and is, of course, material, but its activities are another thing, and are, of course, immaterial. Let water which was still, begin to move. The motion itself is not a new form of matter added to what was there before, but is a new state of the old matter. Whatever the motion in itself may be, it is at any rate not matter; and the same consideration applies to every form of activity. Thus in our living body we have a chain of physical phenomena, accompanied by a chain of immaterial energies, some parts of which we know in ourselves as conscious feeling and thought. If it would be unreasonable to imagine a gap in the physical chain bridged over by something immaterial,

* See above, p. 168.

it would be just as unreasonable to imagine a break in this immaterial chain bridged over by something material. The body, then, undergoes changes partly physical and material, partly psychical and immaterial; and it is these last (whether felt or unfelt) which control and direct the actions of the body, though they, in their turn, are influenced by physical modifications. We may compare this reciprocal influence, to alterations caused by heat in the shape of a ring formed of two inseparably united metals which contract unequally at the same temperatures—alteration in either constituent affecting the compound whole, and therefore affecting the other constituent which also forms part of that whole. Physical changes affect our thoughts and feelings, but our thoughts and feelings also produce physical changes. This accords perfectly with our own experience. We can by our own consciousness discriminate between feelings which are a mere accompaniment of physical actions, and feelings which cause physical actions. In sneezing and in swallowing an object placed very far back in the mouth, we have examples of feelings which accompany automatic actions but do not occasion them. In spitting and scratching we have examples of actions which we know are done by us on account of certain feelings we experience, however true it may be that such actions are sometimes induced reflexly * without such feelings. The argument which arises from the latter fact is not that the feelings do not produce spitting and scratching, but rather that the occurrence of such actions, under abnormal circumstances, without our feeling their performance, argues the presence, in that case also, of some other immaterial energy analogous to sensation, though unfelt. Consciousness tells us that our feelings and thoughts do produce actions, but it cannot possibly say what agency operates when consciousness and consentience are absent. It says nothing, therefore, against or in favour of the existence of an unfelt immaterial energy, analogous to sensation, accompanying reflex actions.

It conflicts with our experience.

As to our felt conscious actions, certainly nothing can well be more contrary to experience than the assertion

* As to *reflex action*, see above, p. 166.

that our thoughts and desires never do or can intervene as causes in the events of our lives. What is the fact? Suppose a servant comes and tells us that an expected guest has arrived. Is it not certain that the actions we thereupon perform are due to our *understanding* of what had been said, and would be quite different if the servant had said the very same words to us but we had not understood them? The actual mental act, the "understanding," is here plainly the cause. If we do not know this (*e.g.* if I do not know that it is my intention to have this work published, which makes me now write; if the reader does not know that it was an intention or wish of some kind on his part which made him refer to these pages) we know nothing. To deny such things would be to deny what is most evident in favour of what is not at all so—some speculative hypothesis, or rather an accumulation of hypotheses on hypotheses. The truth that we every now and then act in a new way because we have acquired some fresh knowledge, is one of those primary truths which are self-evident.*

Conscious volition.

Having thus clearly seen that the intellect can act as a cause, we have thereby cleared away one preliminary difficulty which has been supposed to attend a belief in the action of our will—its intervention as a free cause in that great system of physical causation which surrounds us on all sides. We have now to deal with the action of the will as one of the highest of our higher conscious mental powers, as distinguished from that merely unconscious organic volition we have already† considered—namely, our power of automatically uniting and co-ordinating our pleasurable tendencies into some dominant impulse. Such organic volition leads to the unconscious following of the dominant impulse; but intellectual volition may either result in the conscious following or refusal to follow such an impulse. The freedom of the will is the freedom we have occasionally to do anything, however small, in opposition to our strongest desire or motive. It is not, of course, here maintained that we can always thus act. We may sometimes be so paralyzed by emotion

* For some further remarks, see below, ch. xxv., "Animal Automatism."

† See above, p. 198.

or by some physical injury as to be unable to act at all. But consciousness tells us that we can, at least sometimes, make an internal, mental determination as to some act. It is only for this sort of determination that freedom is here asserted; not for the subsequent act, nor for the feelings and desires which may precede or accompany such act. The reader, if he will reflect, will doubtless be able to recall to mind some occasion when he has made up his mind to act in a certain way which was opposed to what he felt most to like and seemed most to tempt him. In considering this matter, it is necessary to guard against some very common ambiguities of language, and to distinguish clearly between two mental experiences for both of which our consciousness vouches.

Motives.

A very little introspection will suffice to show us that we can clearly distinguish between (1) motives which act upon us and incline us for or against some course of action, and (2) the mental act of will by which we determine either to perform that action or not to perform it.

A motive, and the influence which it may exert to urge us to an act of determination (an act of will), is due to some cause over which we have no control. However it may be ours as a feeling, it is not ours in the sense of originating or springing from us. A volition or determination, however, is the exercise of a new force entirely distinct from the force of the motive. It is ours in the highest degree, in that it originates and springs from us. With respect to motives, our own mind can tell us two things—it can often make us aware of the actual effects of motives, but it can always make us aware of their tendencies. Even when no act of volition results, we are still conscious of the influence of motives upon us, and can, in many cases at least, compare their relative strengths. We are directly aware of their tendencies and of the ways and degrees in which they incline us to act. But to tend to produce action, and to produce it, are two different things. Our consciousness informs us that certain motives are impelling us to form certain determinations; it often distinguishes also between the relative force of these several motives, and it proclaims that no one of these motives

produces or necessitates the determination itself, which it affirms to be one's own act and, as before said, a force distinct from them. The reader is no doubt as able as is the writer, to compare the relative attractions of some competing pleasures, and to be sure that he has resolved to act in opposition to the motive which seemed to promise the fullest gratification. It is, no doubt, often difficult to compare and weigh the attractiveness of two attractions, but we can sometimes do so very easily. Nothing can be easier, for example, than to compare the comfortableness of two arm-chairs, or the sweetness of two kinds of champagne, and the exercise of a real power of choice in the very smallest matter is sufficient to vindicate the existence of such a power. The question as to its existence, and the question as to its extent, are very different questions.

Two verbal ambiguities.

There are two ambiguities of language which often puzzle persons with respect to the freedom of our will. In the first place, "motives" are often spoken of as having been the stronger because they have in certain cases been followed. But of course, if the "strongest motive" is defined as "that which the will follows," it becomes idle to profess to consider whether or not the will always follows the strongest motive: it practically becomes an inquiry whether the will always follows that which actually drags it along! Persons who commit this absurdity forget that the strength of motives can be estimated, not only by their effects, but also, as we have seen, by their tendencies and attractiveness as directly perceived by our own minds. Another ambiguity sometimes attends the expressions "wish" and "prefer." Thus it has been said to be incredible "that any human creature, under any conceivable circumstances, ever acted otherwise than in obedience to that which for the time being was his strongest wish"—the term "strongest" being used in the ambiguous way above pointed out. It has also been affirmed that "we can feel we might have chosen some other course than a course we chose, if we had preferred it; but not that we could have chosen one course while we preferred the other." Now, if the terms "preference" and "wish," as here used, really mean "will," or "determination," then such assertions are mere truisms, since it is

manifest, by the principle of contradiction, that "no one can will what he does not will." But if they do not mean this, they must mean that we cannot determine in opposition to what we feel to be most attractive to us; and this our consciousness clearly denies. The fundamental distinction which exists between inclinations, desires, wishes, likings, etc., on the one hand, and the act of determining (or making a resolution to act in some definite way) on the other, is a distinction which requires to be carefully borne in mind. Moreover, the distinction is plain, since we may at the same time be acted on by two contradictory inclinations with reference to one and the same act. But no one can determine at the same time in two contradictory ways. We must either determine or remain undecided; and if we determine, we must determine in one way or in another. Yet people often say that they "desire" or "wish" to do a thing when what they in reality mean is that they *will it.* They also say every now and then that they "prefer to act in a certain way," without distinguishing whether they thereby mean that it is more agreeable to their feelings or that they elect so to act, and have therefore made a preliminary act of will to perform it.

What consciousness does and does not declare as to our free-will.

When under the influence of contrary motives, we have certainly, as a rule, no consciousness of being forced to act one way or another. When inclined to perform some action—for example, to give sixpence to a beggar or to eat a cutlet—we feel we can either do it or let it alone, though, of course, we may every now and then be overpowered by some violent desire or aversion. We know, in most cases, that we are not, in our volitions, compelled by some mysterious constraint to obey some particular motive. Nevertheless, the will cannot act without any motive. And if we could suppose that in any given case there was but a single motive acting, then we should be sure to follow that motive. If a motive led us to get out of bed, and no motive of any kind—no bodily or mental feeling, and no caprice even—induced us to lie still, we should certainly arise. As there is some goodness in everything which exists, we always, when we act con-

sciously or unconsciously, seek some "good," though it may be one of a very inferior order, as before remarked.*

As to the declarations of consciousness with respect to volition, it may in one way be truly said that we cannot be conscious of freedom as of something positive, because "freedom" means "the absence of necessity or compulsion," and is therefore a negation or nothingness, and we cannot, of course, be conscious of nothing or of a mere absence. But, nevertheless, we may be conscious we are not compelled. Similarly, as to our being conscious of having a power to determine or not to determine, it may be said that we cannot be conscious of such a thing, because there is no such thing as dormant or inactive power, activity being the very essence of power, so that it ceases to exist as soon as it ceases to act. Waiving this question, which is one suitable only for the section on science, the objection tells in no way against that consciousness of our freedom which is here affirmed, namely, our consciousness that we have no perception of being compelled, in all our volitions, to determine in one way or another. It may, however, be further urged that we cannot be conscious, when two courses of action are proposed, that we are able to choose which we will, since it is obvious we can only be conscious of what actually exists, and not of that which is as yet future, or what "might" be.

Nevertheless, these objections do not in the least show that consciousness, properly analyzed, does not inform us of our freedom.

For no one will deny that our consciousness can inform us that we are being dragged along, or otherwise compelled to go in some definite direction, if we are so dragged and compelled. Therefore consciousness must be able to inform us when we are not being dragged along or otherwise compelled. Now, let us suppose that a man is conscious of determining to take a walk. In the first place, he is conscious that it is he himself who determines; and, secondly, that he has no feeling of being forced or compelled in so determining. But to make a man's act of determination a free act, what more is necessary than to

* See above, p. 260.

know that the act is emphatically his act, and that he was exempt from compulsion in making it? Again, though it is better not to affirm that we are conscious of having the power to choose which we will of two alternatives, yet our consciousness may tell us that, when we have determined upon anything, such act of determination is ours, and that before determining on it we stood in the same relation to two alternatives, *e.g.* to walk out or to stop at home. It tells us, further, that we have chosen one alternative, and, at the very same time, we may be conscious of a conviction that we might have chosen the other; just as, when we have drawn one of two balls out of a bag, we know by experience that we have drawn one, and have a conviction, founded on our experience, that we might have drawn the other. In one word, I am perfectly sure that, when I will anything, I am conscious that I myself perform the act, and I am quite unconscious of any necessity compelling me to perform it. This certainty of consciousness enables us to deny point-blank the assertion that consciousness does not inform us that the acts of our will are free. But yet another objection may here be made. It may be urged that our consciousness of freedom does not prove anything, because, if the will were not free, we might, none the less, have precisely the same consciousness as we have. It has been urged by Bayle that in the same way as our consciousness of existence does not inform us whether we exist of ourselves or whether we are indebted for our existence to another, so our consciousness of our acts of will cannot inform us whether we have produced them ourselves or whether we receive them from the same cause which gave us our existence. He has compared man to a conscious weathercock, impressed, at one and the same time, both with a movement to the east and also an internal inclination to turn to the east. Evidently such a weathercock might be under the delusion that it turned itself to the east in accordance with its own inclination to go that way. Now, in the first case, the assertion that the consciousness we have of our existence does not inform us whether we exist of ourselves, may be questioned; and, secondly, it may be objected to the illustration that the

An objection.

hypothesis of the mind (like the supposed weathercock) being simultaneously impressed—in a sort of miraculous manner—with a similar desire and compulsion, is a purely gratuitous hypothesis. But the case is not even fairly stated. For granting that our consciousness of our existence tells us nothing of how we began to exist or where we came from, our consciousness of willing does tell us when it began and whence it proceeded. It cannot be said with any truth, then, that we are conscious of willing in the same way as we are conscious of existing. The true statement of what consciousness tells us when we will anything, is not that we are in a state of willing, but that we are in the act of willing. Indeed, our consciousness tells us that no other act we perform—whether of imagining, believing, thinking, or anything else—is even nearly so much our own act as is our act of willing. But besides all this, Bayle's weathercock actually points against the truth of what he has urged. He supposed it to be at the same time both in the act of willing to turn to the east, and also actually blown in the very same direction. This is parallel with the coexistence of a desire on the part of the reader to go to Edinburgh, together with his being at the same time seized, carried to the railway station, and sent to Edinburgh by force. In that case his volition and the direction of his journey would coincide; but, nevertheless, his common sense would tell him plainly enough that this coincidence was due to his having both desired to go to Edinburgh, and to his having also been forcibly sent there. What would be true in his case must—accepting, for argument's sake, Bayle's illustration—be true also of the weathercock; and so it would know, clearly enough, that it both wished to turn to the east, and was also carried there, "willy-nilly," by the wind.

Free-will and morality.

Although, then, the great majority of our actions are either acts of merely organic volition or conscious acts of will performed without deliberation, our consciousness plainly tells us that we have, at the least occasionally, a power of voluntarily fixing our attention, and that we can, and more or less often do, make a distinct act of will in

opposition to a dominant impulse—an action the direction of which is due to our own absolute and positive origination. This is free-will, and its existence within us is vouched for by other facts besides the direct facts of consciousness. For, as we have seen in the last chapter, we have a distinct perception of right and wrong—of the merit and demerit of actions—as of something essentially different from either pleasure or utility. This perception is one of the ultimate and primary facts of our intellectual nature. But if there is no such thing as free-will, then all idea of merit or demerit is a dream and a delusion. Our reason abundantly assures us that the common sense of mankind is right in affirming that no *moral* blame can possibly be attached to even the most injurious actions, if they are performed by persons who have no power of choice, but are compelled to perform them. We may shoot a criminal lunatic when, owing to the circumstances of the case, we have no other means of saving our lives; but, though we kill him, we are so far from thinking him morally culpable, that we may feel sincere sympathy and pity for him. No moral character can possibly attach to actions which are not free, and if no such actions existed, then there could be no such thing as either virtue or demerit in mankind. The declarations of our own conscience, however, plainly inform us that there are such things as culpability and acts deserving moral approbation; and the voice of this internal monitor is, as we shall see in the next chapter, supported and reinforced by the general judgment of mankind as evidenced by human language. The action of will causing various good or bad actions to be frequently repeated, occasions the development of good or bad habits, since, as we have seen,* our powers and energies are increased by exercise. To a certain extent, there is an analogy between our habits of life and the instinctive actions of animals, and thus we may be said ourselves to make, or at least to develop, some of our own moral instincts.

* See above, pp. 174, 175.

CHAPTER XIX.

MANKIND.

All men have essentially the same intellectual nature.

Anthropology a transitional study, partly subjective, partly objective—Bodily unity—Antiquity of man—Art—Language—Counting—Truth and beauty—Ethics—Religion—Unity of man's nature—Degradation—Human creations—Infancy.

Anthropology a transitional study, partly subjective, partly objective.

HITHERTO we have been almost exclusively occupied with the study either of our minds directly, or of ourselves as individuals, possessed of powers and faculties the nature of which we have examined by introspection. In the next section we shall enter upon a brief survey of the world around us, for the comprehension of which we have mainly to rely upon testimony and common sense.

The present chapter, devoted to the study of mankind, or anthropology, forms a transition from the investigation of matters mainly subjective, to objective studies. For, in the study of mankind, we are still occupied with ourselves in so far as we are investigating that human nature in which we participate, while at the same time we enter upon matters which can only become known to us by external observation, reasoning, and testimony. In the latter aspect man forms for us a part of that external world which on every side surrounds us; in the former, we have still constantly to refer back to the phenomena revealed to us by introspection.

Mankind at the present moment consists of a great diversity of tribes and races, aggregated partly into larger natural groups, and partly into political aggregations—

states or nations. Each tribe, each race and group of races, each state or nation, has, of course, its separate history and its greater or less antiquity, its customs, sentiments, ideas, and language. But the questions which concern us here are questions which regard human beings as one whole. Our object in the present chapter is to ascertain what, in these respects, can be affirmed with the greatest certainty of mankind generally, and it is only with this end in view that attention will be directed to particular facts respecting this or that people at the present time or at antecedent periods.

Bodily unity.

All men agree in possessing a nearly identical bodily structure; that is to say, the differences in this respect which exist between different races are so small that naturalists generally regard mankind as consisting of a single species only; although a few men of science prefer to consider men as constituting a genus made up of a few species. The divergences which are found are slight differences in average size; in relative length of limb; in shape of head and prominence of jaws; in the colour of the skin; in the form and distribution of the hair; in the shape of certain bones, notably those of the pelvis, shin, and heel; in the development of the nose, and in the form of the eyes; and in the relative size of the brain, and in the complexity of the foldings on its surface. No races of men exist as to the human nature of which (estimated by their external form) it is possible to entertain a moment's doubt, nor has it been satisfactorily demonstrated that the offspring of cross-breeds between the more varied races tend to become sterile *inter se.* As to the past history of our kind, we have been as yet unable to find remains which are probably human, yet so widely different from those of existing man as to occupy a place midway between him and some other kind of known creature, although, of course, this fact affords us no grounds for affirming that such an intermediate form may not be at any moment discovered. The antiquity of man is certainly great as measured by the time of which we have certain historical knowledge. The civilizations of Egypt and China extend back for more than six thousand years, but they were prob-

Antiquity of man.

ably preceded by tens of thousands, possibly hundreds of thousands, of years of unrecorded human existence. Nevertheless, no naturalist supposes man to have preceded the ages during which the Tertiary strata * were deposited, and those most disposed to credit him with a great antiquity regard him as a product of Miocene times. Some naturalists (as, for example, the late Professor Paul Gervais and Mr. George Busk) have deemed the Esquimaux to be survivors of such very ancient races. Everywhere man exists, and, so far as we know, has existed, in a more or less social state, at the least in the form of small tribes or families, sometimes habitually wandering from place to place in search of food. Cannibalism has been a widespread, perhaps once almost universal, custom. No men are known to exist who are ignorant of the use of fire,† and ancient remains prove that its knowledge is so old that we are yet unable to affirm the certain past existence of men unacquainted with its use, though such there in all probability once were. All existing men supplement their natural bodily powers by the use of tools and weapons, and this is so universal a characteristic of our kind that it was the discovery of rude flint implements which first clearly proved the antiquity of man to have been so very much greater than was previously supposed, and such implements are still the only evidences of man's ancient existence over wide tracts of the earth's surface. The weapons of very rude savages are commonly ornamented, and art in a rudimentary form may be said to be universally diffused. Even the unknown manufacturers of the rude, unpolished flint implements, made drawings in outline of various animals. We owe to them the only authentic representation of the mammoth, or extinct elephant, scratched on one of that animal's bones. The rudest men can distinguish between the natural and the artificial; they know well enough the difference between the implements

* As to these and other strata, see below, ch. xx., "The Earth's Crust."

† In illustration of the ease with which errors arise from hasty observations and inferences, may be cited Wilkes's "Narrative of the United States Exploring Expedition" (1838–42). Therein the natives of one of the islands visited are said to have been ignorant of fire, though, as Mr. Tylor remarks, "curiously enough," particulars are given in the same work which show that in the same island "fire was in reality a *familiar thing*."

they make and objects made by nature independently of them.

Language.

All tribes of mankind, without exception, possess the faculty of rational speech. "Although," says Sir John Lubbock,* "it has been at various times noted that certain savages are entirely without language, none of these accounts appear to be well authenticated." The recklessness with which assertions are made to the detriment of savage tribes is so great, that no account ought to be received without a knowledge of the bias of the relater, and a careful criticism of his statements. Mr. Tylor makes some excellent remarks on this subject. A Mr. Mercer having said of the Veddah tribes of Ceylon that their communications have little resemblance to distinct sounds or systematized language, Mr. Tylor observes,† "Mr. Mercer seems to have adopted the common view of foreigners about the Veddahs; but it has happened here, as in many other accounts of savage tribes, that closer acquaintance has shown them to have been wrongly accused. Mr. Bailey, who has had good opportunities of studying them, . . . contradicts their supposed deficiency in language with the remark, 'I never knew one of them at a loss for words sufficiently intelligible to convey his meaning, not to his fellows only, but to the Singhalese of the neighbourhood, who are all more or less acquainted with the Veddah patois.'" As to another well-known traveller he remarks,‡ "It is extremely likely that Madame Pfeiffer's savages suffered the penalty of being set down as wanting in language, for no worse fault than using a combination of words and signs in order to make what they meant as clear as possible to her comprehension." He adds also the following very important words, "As the gesture-language is substantially the same among savage tribes all over the world, and also among children who cannot speak, so the picture-writings of savages are not only similar to one another, but are like what children make untaught, even in civilized countries. Like the universal language of gestures, the art of picture-writing tends to prove that the mind of the uncultured

* See his "Origin of Civilization," p. 275.
† See his "Researches into the Early History of Mankind," p. 78.
‡ *Loc. cit.*, pp. 79, 80.

man works in much the same way at all times and everywhere. . . . *Man* is essentially, what the derivation of his name among our Aryan race imports, not 'the speaker,' but he who thinks, he who *means*." That is to say, the substantial agreement amongst men lies in the common possession of that internal, rational, mental word,* of which the mere spoken word is the external manifestation. All men have rational language; that is to say, they can express, by sounds or gestures, universal, objective, highly abstract ideas, in addition to the sounds or gestures by which they give expression to their feelings and emotions. Indeed, no tribe exists which cannot count two, say "I," "woman," "dead," "food," etc. In other words, there is no tribe which does not express general conceptions and abstract ideas by articulate sounds.

Counting. A great deal has sometimes been made of the alleged inability of some savages to count more than five, or even three; but here again we have to thank Mr. Tylor for some apposite observations.† He says, "Of course it no more follows, among savages than among ourselves, that because a man counts on his fingers his language must be wanting in words to express the number he wishes to reckon. For example, it was noticed that when natives of Kamskatka were set to count, they would reckon all their fingers, and then all their toes, getting up to twenty, and then would ask, 'What are we to do next?' Yet it was found on examination that numbers up to a hundred existed in their language." But no one even pretends that there are savages who cannot count two or three, and we have already seen‡ what intellectual perceptions and powers are involved in the doing of even that.

Truth and beauty. That many savages are frequent or habitual liars is an assertion which has been often made by travellers, while individuals or exceptional tribes have sometimes been praised for truthfulness. There can be no question, however, but that all men understand what stratagems, deceits, and lying are, and this they cannot have without possessing a comprehension of "truth." Similarly the idea of beauty is one common to mankind, although there is great

* See above, p. 235.

† See his "Primitive Culture," vol. i. p. 322.

‡ See above, p. 241.

divergence of opinion as to what is beautiful. Greek art seems to have supplied us with eternal models of human beauty; but they are not types of beauty to the Mongol or the Hottentot, who would also be displeased by the lip-distortion of the Botocudos, or the head-flattening of other tribes. Indeed, as we lately observed, it is a well-known proverb that tastes are not matters to dispute about. Nevertheless, men not only feel the charm of beauty, but have that abstract idea, as is shown by the elaborate, however grotesque, adornments with which the lowest savages decorate themselves, the adoption of ornaments of some kind being far more universal than the adoption of clothes. They are, then, not only attracted by what charms their senses, but practically recognize the fact and know the qualities which charm them. The diversities of taste of different ages and different climes in no way conflicts, then, with the assertion that an idea of "beauty," as well as an idea of "truth," is an attribute of humanity. Nevertheless, the action upon us of our surroundings, the association of ideas, the popular feeling about us, and the probably inherited taste of our family, tribe, or nation, give rise to likes and dislikes, and may blind us to many beauties, but never to all beauties. They may modify, but can never destroy our apprehension of the beautiful. Thus may be explained the horror often felt at the sight of certain objects, such as serpents, and the various strange fashions and deformities of different wild tribes; as also the liking for deformed feet amongst the Chinese, and for certain bodily distortions fashionable amongst ourselves. Such things are the effects of custom, and are welcome and agreeable, through a possibly unconscious association of ideas; as the sight of a tall hat and correctly cut coat may be agreeable to certain persons as harmonizing with their expectations and their sense of fitness, though they would not assert that it is their perception of ideal beauty in such things which pleases them. Thus the attractiveness of objects, or our liking for them under certain circumstances, is to be clearly distinguished, as before pointed out,* from an intellectual apprehension

* See above, p. 255.

of objective beauty, although the presence of that idea in mankind generally is evidenced by their love of ornamentation, and by their adornment of themselves and of the objects they live amongst and make use of. The faculty of apprehending beauty is one which, as a rule, may be greatly increased by culture. Education produces more and more agreement as to such perceptions. This we can plainly see as regards poetry, architecture, painting, sculpture, and it is especially manifest in the study of nature, which gradually reveals to us new fields of beauty that ignorance had previously hidden from our gaze.

Ethics. As it is certain that sections of mankind differ in matters of taste, so also it is notorious that men differ as to their estimate of the moral character of certain actions. Does or does not this show that there may be tribes of men so low as to be devoid of all moral perceptions? The existence of kindly social customs cannot be taken as necessarily proving the existence of moral apprehensions in the absence of some intimation by word or gesture of a judgment of the kind. Certainly no preference of the interests of the tribe over self, or anger at the absence of such preference, is moral, unless there is a judgment that such preference is right. Similarly, no amount of gross or atrocious habits in any given tribe can be taken to prove its entire absence. The prevalence in any tribe of practices which shock us, will never suffice to prove the absence of moral perception in such tribe. Men are not necessarily devoid of morality because they draw their ethical lines in different places from what we do. The most horrible actions, such, *e.g.*, as the deliberate slaying of aged parents, may really be the result of true moral judgments under peculiar conditions. It is said to be done by some savages in obedience to the wish of their fathers and mothers, who think thereby to escape further suffering in life, and to secure prolonged happiness after death. Their parricidal children draw correct inferences from true principles, but are mistaken as to facts. Men do not always agree about the application of moral principles; what they agree about is the principles themselves. Thieving may have been here and there encouraged and advocated, yet

dishonesty is nowhere erected into a principle, but is reprobated in the very maxim "honour amongst thieves." Frightful cruelty towards prisoners was practised by the North American Indians, but it was towards *prisoners*, and cruelty was never inculcated as an ideal to be always aimed at, so that remorse of conscience should be felt by any man who happened to have let slip a possible opportunity of inflicting torture. Men have often thought it "right" to do unjust things, but have never thought actions "right" *because* they were "unjust," or "wrong" *because* they were "just." One of the clearest ethical judgments is that as to "justice" and "injustice;" and by common consent the native Australians are admitted to be at about the lowest level of existing social development, whilst the Esquimaux are, as has been said, deemed by some men of science to be surviving representatives of about the oldest known races of mankind. Now, concerning the Australians, Sir John Lubbock tells us* they consider "crimes may be compounded for by the criminal appearing and submitting himself to the ordeal of having spears thrown at him by all such persons as conceive themselves to have been aggrieved, or by permitting spears to be thrust through certain parts of his body, such as through the thigh, or the calf of the leg, or under the arm. The part which is to be pierced by a spear is fixed for all common crimes, and a native who has incurred this penalty sometimes quietly holds out his leg for the injured party to thrust his spear through! So strictly is the amount of punishment limited, that if, in inflicting such spear-wounds, a man, either through carelessness or from any other cause, exceeded the recognized limits—*if*, for instance, he wounded the femoral artery—he would in turn become liable to punishment." A yet stronger example of savage moral perception is also furnished us by the Greenlanders. Should a seal escape in Greenland with a hunter's javelin in it, and be killed by another Greenlander afterwards, it belongs to the former. But if, after the seal is struck with a harpoon and bladder, the string breaks, the hunter loses his right. If a man

* See his "Origin of Civilization," p. 318.

finds a seal dead with a harpoon in it, he keeps the seal but returns the harpoon. Any man who finds a piece of driftwood can appropriate it by placing a stone on it, as a sign that some one has taken possession of it. No other Greenlander will then touch it.

The inhabitants of Tierra del Fuego are, if possible, more wretched savages than the Australians. Yet it is very interesting to note that, even with regard to these, Mr. Darwin informs us that when a certain Mr. Bynoe shot some very young ducklings as specimens, a Fuegian declared in the most solemn manner, "Oh, Mr. Bynoe! much rain, snow, blow much!" And as to this declaration, Mr. Darwin tells us that the anticipated bad weather "was evidently a retributive punishment for wasting human food," *i.e.* for a transgression of the rudimentary moral code recognized by the Fuegians. That the language of savage tribes is capable of expressing moral conceptions, will probably be contested by no one. Similarly, no one will deny that when a savage emphatically calls "bad," an act of treachery done to himself by one to whom he has been kind, his mind recognizes, at least in a rudimentary way, an element of "ingratitude" in such an action. But, in fact, the identity of intellectual nature which we have already recognized as existing in men, since they have all the power of language, establishes a very strong *à priori* probability in favour of a similar universality as to the power of apprehending good and evil. The evidence *à posteriori* to the same end is also abundant in the eyes of the most unprejudiced witnesses. Thus Mr. Tylor observes, "Glancing down the moral scale amongst mankind at large, we find *no* tribe standing at or near zero. The asserted existence of savages so low as to have no moral standard is too *groundless to be discussed*."

It would be a great mistake to suppose that very barbarous people cannot be moral. Instances are easily to be found of the coexistence of moral excellence, accompanied by the rudest conditions of life with respect to the mere appliances of physical well-being. Mr. Tylor tells us* that

* See his "Primitive Culture," vol. i. p. 45.

the wild Veddahs of Ceylon, though extremely barbarous as to their dwellings, clothing, etc., "are most truthful and honest," and "their monogamy and conjugal fidelity contrast strongly with the opposite habits of the more civilized Singhalese." Sir John Lubbock quotes the subjoined particulars respecting the social state of the Esquimaux:* "Captain Parry gives us the following pictures of an Esquimaux hut: 'In the few opportunities we had of putting their hospitality to the test, we had every reason to be pleased with them. Both as to food and accommodation, the best they had was always at our service; and their attention, both in kind and degree, was everything that hospitality and even good breeding could dictate. . . . I can safely affirm that, while thus lodged beneath their roof, I know no people whom I would more confidently trust, as respects either my person or my property, than the Esquimaux.' Dr. Rae, who had ample means of judging, tells us, 'The more I saw of the Esquimaux, the higher was the opinion I formed of them.'" That, on the other hand, many tribes and races are bloodthirsty, cruel, and vindictive, or given over to gross licentiousness, is no doubt true; but such facts tell no more against their power of perceiving and distinguishing right from wrong than does the wrong conduct of many a civilized man amongst ourselves.

Mr. Tylor, speaking of the various social conditions in which men have existed, has said,† "Their various grades of culture had each, according to its lights, its standard of right and wrong, and they are to be judged on the criterion whether they did well or ill according to that standard." Although there may be tribes of savages, as there are too many Europeans, who seem devoid of moral feelings or ideas, yet, so far as we have been able to ascertain, no evidence whatever has yet been obtained either of the existence of races of men really without any moral perceptions, or of tribes possessing an inverted code of ethical principles. A power of occasionally distinguishing an element of right and wrong in actions, is a power possessed

* "The Origin of Civilization," p. 343.
† In the *Contemporary Review* for June, 1878, p. 72.

by all human beings who are not out of their minds, and even by very many of those who are in that sad condition.

Closely akin to this subject are those acts of respect whereby men express their reverence for certain of their fellows. Sometimes men prostrate themselves, or strike the ground with their heads, or, having touched the ground with their hand, they then touch their own heads with it. Sometimes, also, more or less clothing may be removed, as from the feet on entering a mosque, or from the head as in the ordinary salute of Europeans. No doubt these actions often denote a feeling of more or less apprehension, but they may be the expression of the intellectual judgment—"that man deserves reverence from me." We know this by our own minds, and therefore it is but reasonable to suppose that when other men perform the same action, they may often express thereby that which we ourselves intend to express, and which is one form of giving expression to a judgment of moral approbation.

Religion. Man seems everywhere and at all times, so far as our means of observation and valid inference extend, to have entertained ideas of religion. That is to say, man has had the notion that some kind of personal relations existed, or could exist, between himself and some invisible being or beings, malevolent or benevolent, possessing supernatural powers, and either essentially similar to him in nature, or at least with powers bearing a more or less distant analogy to human intelligence and will. Religion may be thus defined as "a sociology of intelligences"—embracing the relations which should exist both amongst men, and also between men and all non-human intelligences.

The universal tendency of even the most degraded tribes to practices which clearly show their belief in preternatural agencies, is too notorious to admit of serious discussion; while the widespread, and probably all but universal, practice of some kind of funeral ceremony speaks plainly of as widespread a notion that the dead in some sense yet live.

Mr. Tylor has on this subject observed,* "The savage

* "Primitive Culture," vol. ii. p. 18.

who declares that the dead live no more, may merely mean to say that they are dead. When the East African is asked what becomes of his buried ancestors, the 'old people,' he can reply that 'they are ended,' yet at the same time he fully admits that their ghosts survive. These ghosts, however, were often associated with dreams which seem to have been not unfrequently imperfectly distinguished from waking perceptions." Concerning the existence of savages without any form of religion, he further says,* "The case is in some degree similar to that of the tribes asserted to exist without language or without the use of fire. . . . As a matter of fact, the tribes are not found."

It is not, of course, meant to affirm that all savage men, any more than all civilized men, believe in a future life, or in one or many gods; what is here affirmed is the fact that the reality or possibility of some quasi-social relations between men and invisible intelligences, is so widespread as to be a common attribute of mankind, while every now and then ideas of religion of a more developed kind than might have been expected, come under our observation. In a prayer used by the Khonds of Orissa we find the following words: "We are ignorant of what it is good to ask for. You know what is good for us; give it us." Some form of religious worship has been almost universal, and, as every one knows, very generally idols have been worshipped, sometimes with grossly licentious rites, and sometimes with human sacrifices, followed, as in Mexico, by a solemn act of religious cannibalism. Not unfrequently children were sacrificed as a propitiatory offering of what was nearest and dearest. The fact that sacrifice was very generally connected with, if not evolved by, a wish to feed the ghosts of the departed, is unquestionable; but the idea may have originally been, and it certainly subsequently became, a mixed one. If food in the earliest days of man's existence was the thing to sacrifice which, constituted the greatest self-denial easily practised, its sacrifice might have been partly due to this higher conception. As Mr. Tylor justly says,† "We do not find it easy to

* "Primitive Culture," vol. i. p. 378.

† Ibid., vol. ii. p. 360.

analyze the impression which a gift makes on our own feelings, or to separate the actual value of the object from the sense of gratification in the giver's goodwill, and thus we may well scruple to define closely how uncultured men work out this very same distinction in their dealings with their deities." In a Zulu prayer we find the expression, "If you ask food of me which you have given me, is it not *proper* that I should give it to you?" Here the later and full idea of sacrifice seems to exist in germ. That the Australians can be made to understand our religious ideas has been abundantly demonstrated by Bishop Salvado,* who has long had under his care a flourishing community of reclaimed savages at his Benedictine Abbey, near Perth, in Western Australia.

Unity of man's nature.

From the foregoing observations it seems clear that all men possess an intellectual and bodily nature, which is essentially one, however it may vary in minor details. We are very apt to be misled in this respect by small matters which affect the imagination, but which the judgment, on reflection, must own to be trivial. Even in our intercourse with our own fellow-countrymen, we are sometimes tempted to despise an intellect which manifests itself by uncouth gestures and coarse speech, wherein the rules of grammar and correct pronunciation are violated; and yet that intellect may be quite as good as our own. I have been myself more than once surprised, when talking with peasants, to find how correct was their appreciation even of questions of philosophy, when once I had got over the difficulties arising simply from our different modes of expressing essentially similar ideas.

Here again we may profitably refer to Mr. Tylor, who writes as follows:† "The languages of the world represent substantially the same intellectual art, the higher nations, indeed, gaining more expressive power than the lowest tribes, yet doing this, not by introducing new and more effective central principles, but by mere addition and improvement in detail." Speaking of the natives of

* See "Mémoires Historiques sur l'Australie," par Mgr. Rudesimo Salvado. 1854.

† "Primitive Culture," vol. i. p. 216.

Fernando Po, he tells us,* "There are hundreds at about as high an intellectual level as those of Europe," and he cites examples. "Man's craving to know the causes at work in each event he witnesses, the reasons why each state of things he surveys is such as it is and no other, is no product of high civilization, but a characteristic of his race down to its lowest stage. Among rude savages it is still an intellectual appetite whose satisfaction claims many of the moments not engrossed by war, sport, food, or sleep." †

What can more plainly indicate the presence of true intellect than the apprehension of those very abstract ideas, "the *what*, the *how*, and the *why*"? The investigation of such questions constitutes, as we shall see, the highest form of science. Mr. Darwin tells us ‡ about the Fuegians, who rank amongst the lowest barbarians: "I was continually struck with surprise how closely the three natives on board H.M.S. *Beagle*, who had lived some years in England and could talk a little English, resembled us in disposition and in most of our mental qualities. The American aborigines, negroes and Europeans, differ as much from each other in mind as any three races that can be named; yet I was incessantly struck, whilst living with the Fuegians § on board the *Beagle*, with the many little traits of character, showing how similar their minds were to ours; and so it was with a full-blooded negro with whom I happened once to be intimate." The before-mentioned Bishop Salvado has experimentally demonstrated that, by careful and persevering treatment, the Australians can be made to understand some of our highest abstract ideas. Nevertheless, just as brain disease or deformity may be a bar to all intellectual manifestations, so it is conceivable that very unfavourable conditions may render some families of men incapable of exhibiting their essentially intellectual nature. Still none such have yet been discovered, and the world is now pretty well known.

* "Primitive Culture," vol. i. p. 80. † Ibid., p. 332.

‡ "Voyage of the *Beagle*," vol. i. pp. 34, 232.

§ In the "Life and Letters of C. Darwin," vol. iii. pp. 127, 128, it is stated that the Fuegians showed intellectual capacities for which Mr. Darwin was quite unprepared. He is also quoted as saying, with respect to some missionary efforts, "The progress of the Fuegians is wonderful, and had it not occurred would have been to me quite incredible."

Degradation.

But not only is the evidence that men are essentially one in intellect overwhelming, but there is also much evidence to show that very many of the lower races of mankind are degraded, and have fallen from some higher antecedent condition.

Social progress is an exceedingly complex phenomenon, the result of many factors. No one will probably contest the inferiority, in many respects, of the Greece of our day to that which listened to the voices of Plato and Pericles. "Even granting," says Mr. Tylor,* "that intellectual, moral, and political life may, on a broad view, be seen to progress together, it is obvious that they are far from advancing with equal steps. It may be taken as a man's rule of duty in the world, that he shall strive to know as well as he can find out, and do as well as he knows how. But the parting asunder of these two great principles, that separation of intelligence from virtue which accounts for so much of the wrong-doing of mankind, is continually seen to happen in the great movements of civilization. As one conspicuous instance of what all history stands to prove, if we study the early ages of Christianity, we may see men with minds pervaded by the new religion of duty, holiness, and love, yet at the same time actually falling away in intellectual life, thus at once vigorously grasping one half of civilization and contemptuously casting off the other."

This aspect of the question has an important bearing upon our mode of regarding the earliest families of man. It is plain that some moral standard might have existed with a most rudimentary state of art and the scantiest appliances of material civilization. Mr. Tylor also says, "Ethnographers who seek in modern savages types of the remotely ancient human race at large, are bound by such examples to consider the rude life of primæval man under favourable conditions to have been, in its measure, a good and happy life."

It is difficult for us, surrounded by the abundant aids afforded by international communication, to realize the different effects which would probably result from an

* "Primitive Culture," vol. i. p. 25.

absence of such assistance and stimulus. This is also perceived by Mr. Tylor, who remarks,* "In striking a balance between the effects of forward and backward movements in civilization, it must be borne in mind how powerfully the diffusion of culture acts in preserving the results of progress from the attacks of degeneration." Therefore in early periods, when there was little diffusion and no intercommunication between groups which had become isolated, degeneration might very easily have taken place, and these isolated groups may have become the parents of tribes now widely spread. Indeed, it is quite true that "degeneration probably operates even more actively in the lower than in the higher culture. Barbarous nations and savage hordes, with their less knowledge and scantier appliances, would seem peculiarly exposed to degrading influences."

After giving an instance from West Africa, Mr. Tylor continues, "In South-East Africa, also, a comparatively high barbaric culture, which we especially associate with the old descriptions of the kingdom of Monomotapa, seems to have fallen away, and the remarkable ruins of buildings of hewn stone, fitted without mortar, indicate a former civilization above that of the native population." But actual degradation is a fact which is directly attested, and which the ruins of Central America demonstrate. "Father Charlevire has related how the Iroquois, having had their villages burnt, did not take the trouble to restore them to their old condition. . . . The degradation of the Cheyenne Indians is matter of history, and Lord Milton and Dr. Cheadle came upon an outlying fragment of the Shushway race, without horses or dogs, sheltering themselves under rude temporary slants of bark or matting, falling year by year into lower misery."

Thus we may be *certain* that some savages have been degraded from a higher level, and this establishes an *à priori* probability that many have been so. Such degradation in some regions would not, however, be inconsistent with the existence of a considerable amount of progress in others. The New Zealanders show evidence of a possible

* "Primitive Culture," vol. i. p. 39.

degradation through changed conditions, as they doubtless at one time inhabited a more favourable clime. They show this by their use of the well-known Polynesian word "niu" (cocoa-nut) for different kinds of divination, thus keeping "up a trace of the time when their ancestors in the tropical islands had them and divined by them."

How soon the use even of stone implements may be forgotten was proved by Erman in Kamskatka,* who got there a fluted prism of obsidian; "but though one would have thought that the comparatively recent use of stone instruments in the country would have been still fresh in the memory of the people, the natives who dug it up had no idea what it was." Again, "The Fuegians† have for centuries used a higher method" of making fires than have the Patagonians. This looks very much like the survival of a higher culture as to this practice in the midst of a wide-spread degeneracy. Such an explanation is strengthened by the following remarks‡ about the Fuegians: "This act of striking fire, instead of laboriously producing it with the drill, is not, indeed, the only thing in which the culture of this race stands above that of their Northern neighbours," their canoes also being of a superior quality. Mr. Tylor thinks that the South Australians may have learnt their art of making polished instruments of green jade from "some Malay or Polynesian source," instead of its having survived the wreck of a higher culture, as the fire-making act of the Fuegians has probably done. But this is a mere possibility, and experience shows us how often such acts are *not* learnt even when we know for certain that the opportunity of learning them has been offered. Thus our author himself remarks§ that the North Americans never learnt the art of metal-work, etc., from the Europeans of the tenth century. That the belief in the persistence after death of the same social conditions as have existed during life may sometimes also be a result of degradation, is shown by the spread of modern "spiritualism," which has widely propagated that belief amongst people whose ancestral creed taught a much more elevated doctrine.

* "Researches into the Early History of Mankind," p. 207.
† Ibid., pp. 245, 246. ‡ Ibid., p. 259. § Ibid., p. 205.

A curious proof of degradation of one or another kind is exemplified by the ceremonial purifications practised by the Kafirs. Respecting these Mr. Tylor remarks,* "It is to be noticed that these ceremonial practices have come to mean something distinct from mere cleanliness. Kafirs who will purify themselves from ceremonial uncleanness by washing, are not in the habit of washing themselves or their vessels for ordinary purposes, and the dogs and the cockroaches divide between them the duty of cleaning out the milk-baskets." Therefore here one of two things must be conceded. We have either a case of degradation and degeneration from earlier cleanliness, or else there must have been an original spiritual meaning in certain primitive washings, pointing to a higher religious condition than that at present existing amongst those who practise the ceremonies in question.

Degradation may have its origin either in moral and intellectual changes, or in changes in the material conditions of life. No error can be greater or more fatal than that of supposing that philosophical, speculative views do not carry with them far-reaching and inevitable practical consequences. A generation of men, nurtured in the noble traditions which have descended to us from the days of Athenian culture, has tastes and sympathies due to that nurture, which we are too apt to suppose must be permanent acquisitions such as no subsequent intellectual changes can possibly destroy or degrade. But the history of mankind teaches us a very different lesson. The world is sown broadcast with the traces of civilizations which have passed away, and bears many a scar due to the triumph of ignorance and brutality over relative refinement and culture.

Human creations.

While adverting both to what has thus been lost and what has been gained during the various national advances which history records, we wish the reader to note how great has been the creative faculty of man, above all, in the domain of art. In our survey of the lower worlds of life, we shall see that every living organism is, in a sense, a creator, in so far as it builds up its own body, transforming surrounding substances into its own substance.

* "Primitive Culture," vol. ii. p. 393.

If even the very lowest creatures are thus marvellously endowed, how much more so are such creatures as nest-building insects and birds? Man, however, has a power of creation out of all proportion to that possessed by any inferior organism. The ideal conceptions of the painter, the sculptor, the musician, and the architect, are universally recognized, by those best able to appreciate them, as veritable creations of genius which their most painstaking successors may vainly attempt to rival. The great significance of this remark will become manifest in the fifth and last section of this work.

Infancy. We seem, then, if the arguments here stated are valid, to have full assurance that all men, apart from pathological conditions, have that same essentially intellectual nature which self-consciousness reveals to us as existing in ourselves. It may, however, be objected that all human beings are not rational, because infants are not so; they at first show less signs of intelligence than most mere animals do when adult, and only slowly grow to manifest the distinctive mental powers of human beings. To this it may be replied that the true, though temporarily hidden, nature of any germinating organism—egg or seed—is plainly shown us if we are able to watch the outcome of its development. Judged by this rule, the infant must be deemed to possess a nature so far essentially rational that it is sure soon to make that rationality quite plain on the occurrence of constantly recurring and very simple conditions, as is a matter of daily experience. We have already seen* at how early an age the human intellect manifests itself—long before the infant is able to speak. We cannot, of course, know by direct knowledge the state of our own minds when we were so young, because no efforts enable us to recall such early experiences. But we know by consciousness the meanings of our own gestures now, and we can compare them with those of other adults and of children of all ages, and the only rational way to judge of the mental nature of the very young is by such observations, and not by vague speculations as to what might have been our condition at a time about which we can know nothing.

* See above, p. 227.

Thus judged, infants must be allowed to be potentially rational. Children can not only be easily taught, but they soon spontaneously exhibit signs of possessing that intellectual nature which is unquestionably the common property of full-grown men and women. The significance of these preliminary remarks will appear later on, when, having briefly reviewed, in our next section, the world about us, we pass on to the consideration of those problems which it is the task of science to elucidate. In treating of the world, as we now proceed to do, we can, of course, only touch upon points which more or less closely relate to the purpose of the present work, and afford data for determining those questions to which the attention of the reader will be directed in our final section.

SECTION IV.

THE WORLD.

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CHAPTER XX.

INORGANIC NATURE.

Our world is a planet attendant on a star, and is a theatre of physical activities. It possesses a chemical composition which it shares with the surrounding universe, while its crust is composed of materials the arrangement of each part of which is intimately related to antecedent material conditions.

The earth as a cosmical body—Physical activities—Chemical substances—Crystals—Air and water—Aqueous action—Ocean currents—The earth's crust—Fossils.

A CERTAIN general knowledge of the conditions, powers, and properties of the world about us has now become the common property of all moderately educated people, and it is not our intention to do more here than remind the reader of certain facts included in such general knowledge. So much, however, it seems requisite to do in order that there may be the needful data ready to hand for reference, when we come to consider certain scientific problems which will be spoken of in the last section. The earth, as every one now knows, is a sphere, revolving on its axis daily and accomplishing an annual revolution, and it is a planet, *i.e.* one of those spheres revolving round the sun, which, together with their satellites, certain comets and clouds of meteoroids, constitute our planetary or solar system—itself one of the many systems of suns (with or without attendant planets) which make up the visible stellar universe. The various bodies of this universe, which vary immensely as to size, are continually changing their relative positions according to the laws of mechanical

The earth as a cosmical body.

motion together with the force of gravity, the result being that the members of such planetary systems as ours, revolve round their suns, or central bodies, in ellipses, variously attended by satellites revolving in turn, in ellipses, around their respective planets. In some distant systems there may be more than one sun. Our solar system itself is rushing at the rate of ten thousand miles every half-hour in the direction of the star π, in that apparent group of stellar bodies which is named the constellation Hercules. The known universe, or cosmos, is made up of bodies variously composed of solid, fluid, and gaseous matter, which bodies differ greatly in density, some of them being much more dense than our earth, while others are composed of nothing but gases and vapours of great tenuity—those stellar aggregations of matter known as "nebulæ." The cosmical bodies shine by self-emitted light, as does our sun and the variously distant stars; or by reflected light, as do the planets and satellites of our solar system; and doubtless multitudes of planets of other systems, though some planetary bodies themselves are more or less self-luminous. Light travels at enormous speed (over 186,300 miles in a second) through whatever intervenes between, and connects together all the planetary and stellar bodies. A universally diffused highly elastic substance of extreme tenuity, termed "ether," is commonly said to be thus interposed, and we are taught by physicists that minute waves of a certain kind traversing this ethereal medium constitute light—waves of different lengths giving rise to our perceptions of different colours.* According to this view, wherever light can travel there must be ether; and it can travel through every known interval of every other substance, even including the most perfect so-called vacuum which we can make. It follows, therefore, that we have no evidence of the existence of a real vacuum anywhere, but rather that there is and can be none. The distance from us of the stellar bodies, the so-called "fixed stars," being enormous—that of the nearest star being about 200,000 times more distant from us than the sun—the time which light must take in passing from

* See above, p. 99.

them to our eyes is to be measured by years—three years from the nearest star. Even the light of the sun takes more than eight minutes to cross the ninety-two thousand seven hundred millions of miles of ether which are interposed between it and us. The surface and atmosphere of the sun is a region of intense heat and activity. Amidst flames of hydrogen thousands of miles high, metallic vapours are continually ascending, to be condensed and then fall down in showers of red-hot metal. The sun is 852,900 miles in diameter, and is 1,252,700 times the volume of the earth; while the largest of the planets, Jupiter, is but 1233 times the earth's volume.

The planets of our system, with their satellites, move round the sun in one direction; but there is an exception in the case of the satellites of Uranus, which move in a retrograde direction, and in planes nearly perpendicular to the ecliptic. The planets all revolve on their axes during their revolution round the sun, and generally their attendant satellites revolve round the planets they attend more slowly than such planets revolve on their own axes. An exception, however, occurs in the case of the planet Mars, one of the satellites of which circulates round it in less than one-third of the time that planet takes to revolve on its own axis.

Physical activities.

The descent of meteorites upon the surface of this planet give us the plainest proof that the same chemical substances exist in the solar system external to this earth as exist in the earth itself. But that careful dissection of light which is known as "spectrum analysis" shows us that a similar identity of materials exists between the substances which compose our earth, and those which enter into the composition of even the most distant stellar bodies yet discovered. Thus the action of gravity and the energies known as light, heat, mechanical motion, and chemical action, as also, doubtless, those activities spoken of as electric and magnetic, seem to be diffused throughout the visible universe. These physical activities are spoken of as the "physical forces," and brilliant modern discoveries have shown that there is a quantitative equivalence between the different successive activities of the same or of different

bodies. Thus the disappearance of a definite amount of motion is followed by the appearance of a definite amount of heat, and so on; and the works of our most distinguished physicists are replete with wonderful examples of this quantitative equivalence between many of the activities which bodies of all kinds exhibit.

As might be expected, though some of the planets of our solar system differ greatly from the earth in density and other physical conditions, there is a substantial resemblance between them which is sometimes carried very far. Thus our near neighbour, the planet Mars, appears to be so like our earth as to have its tracts of land and sea and its caps of polar ice comparable with those of our own globe. The cosmical body nearest us (only 238,818 miles distant)—our own satellite the moon—is, however, singularly different from the earth, in that it appears to be devoid both of water and air; or if such substances exist in it at all, they seem to have retreated into the interior of our satellite, and to give no signs of their presence on its much-scarred surface. The moon revolves only once on her own axis while revolving round us. Our own world's annual path round the sun varies slightly in two directions; alternately approximating more nearly to, and diverging further from, a truly circular path. The direction also of the earth's axis slightly varies, each pole thus describing a small circle in a very long period of time; that is to say, in nearly twenty-six thousand years. This movement is spoken of as the "precession" of the earth's axis or of the "equinoxes." The combined result of these two alternating changes is to expose each pole of the earth in turn to a maximum of the solar heat which it can receive, and then in turn to the greatest cold of which it is susceptible.

Chemical substances.

The earth itself is a sphere, slightly flattened at the poles, made up of a number of substances which, with rare exceptions—such as gold, carbon, sulphur, and a few more—can be resolved into other apparently component materials, and these into others, and so on, till we come to certain substances known as "chemical elements," because as yet they cannot be * further reduced, and seem to be

* See above, p. 147.

ultimate substances. The few substances which may be met with in a pure and unalloyed condition—such as gold, sulphur, etc.—are examples of such "elements." Our atmosphere consists of a mixture of the gaseous elements oxygen and nitrogen, with some carbonic acid gas (resolvable into the elements oxygen and carbon), a certain amount of ammonia (resolvable into the elements nitrogen and hydrogen), and the vapour of water. Water itself, when pure, is entirely resolvable into the two elements oxygen and hydrogen; but it also ordinarily contains some carbonic acid, ammonia, carbonate of lime, flint in solution, and sundry salts. Carbonate of lime is resolvable into lime and carbonic acid, and lime itself is further resolvable into oxygen and the metallic element called calcium. Flint can be resolved into oxygen, and a metal called silicon, as the rust of iron can be resolved into oxygen and iron. Thus flint may be said to be a "rust" of silicon, and lime a "rust" of calcium.

The solid earth, with its envelopes of water and air, constitutes what we mean by "the inorganic world," while "the organic world" comprises the totality of plants and animals. The inorganic world, therefore, includes all rocks, metal, and softer solid substances which compose the earth; water (both as it exists in seas and rivers, and in the form of minute particles floating in the air); and the gases and vapours of our atmosphere.

The process of resolution of substances into their elements (analysis) shows us that the elements which compose each kind of substance are combined in one exactly definite manner, as estimated by weight. Certain substances when placed in close proximity to certain other substances undergo a spontaneous transformation, as if the elements of one had an overpowering attraction towards the other. In this way there takes place either a reciprocal interchange of elements,* or one substance is deprived of one of its elements, so that only a single element remains in the

* Thus, if we place together nitrate of silver ($AgNO_3$) and hydrochloric acid (ClH), the chlorine will leave the latter to unite with the silver of the former and produce chloride of silver (AgCl), while the hydrogen of the hydrochloric acid will unite with the nitrogen and oxygen of the nitrate of silver, so forming nitric acid (HNO_3)—a process of reciprocal exchange.

place of the substance decomposed. These chemical changes not only occasion warmth,* but may be greatly facilitated by warmth, and apparently also by the presence of other substances which are themselves undergoing analogous processes of change. This process of inducing chemical change by the mere proximity of substances undergoing some other chemical change, is called "catalysis."

Very many substances, to say the least, can exist in three states—solid, fluid, or aëriform; as in the familiar instance of water, which may be in the form of ice, fluid water, and vapour. Even the gases oxygen and nitrogen have been liquefied by cold and great pressure; and carbonic acid gas has also been both liquefied and solidified.

Crystals. Solid substances may or may not be in the form of *crystals.* A "crystal" is a solid mineral substance of a definite geometrical figure, being bounded by surfaces, or *faces*, which meet so as to form sharp edges and angles. The angles formed by these faces are constant in each crystalline substance, though there is no constancy as to the size of the crystals, or the proportionate size of their several faces. Snow is one very familiar example of a crystal. If a crystal be suspended in water which holds in solution as much as it can hold of the same material as the crystal, then if the fluid be evaporated, fresh solid material may be deposited from the fluid on the surface of the crystal, which will thus increase in size. If a crystal so suspended be mutilated by having one of its solid angles removed, then such injury will be repaired by the deposition of fresh material from the fluid. Crystals may be so formed as to adhere together, shooting out into an arborescent manner resembling some vegetable growth—the fronds of ferns or what-not—as in the familiar example of "frost" upon a window-pane. Some masses of mineral are formed of minute aggregated crystals, as is the case with marble. Another mineral may be of similar chemical composition but not crystalline, as chalk. But the same chemical substance may exhibit another diversity. It may exist in one of two conditions called "crystalloid" and "colloid" respectively. Some substances (as, for example, "peroxide

* See above, p. 159.

of iron") may be either in the form of a jelly and insoluble in water, or they may be in a state in which they are quite soluble in water. Moreover, they may be made to pass from the latter state to the jelly-like state by adding a minute quantity of certain substances.* It is in the insoluble and jelly-like condition that these substances are called "colloids," and their condition spoken of as "colloidal." It is in their other condition that they are spoken of as "crystalloids." Now, "colloids" are not only jelly-like and insoluble in water, but they absorb and transmit water readily through their substance. Crystalloids are the reverse of all this, and not only so, but are specially remarkable for their diffusibility; while colloids can hardly at all diffuse themselves through the substance of other colloids. Colloids, once more, not only readily absorb water and swell, but they also readily yield it up again by evaporation.

There is also a peculiar interaction of fluids which is to be noted. If two fluids of different densities are so placed within a vessel that they are separated by a median porous partition, then some of both fluids will pass through the partition, but more of the less dense fluid will pass through it than of the other. The consequence is, that if the level of the two fluids be at first the same on each side of the partition, then the level of the denser fluid will rise, while that of the less dense fluid will sink. This process of fluid transference is called "osmosis," and it is facilitated if the partition be a colloidal substance.

Air and water.

As to the nature of the ultimate components of the aëriform and watery envelopes of our earth, the following points may be noted: *Oxygen* is a colourless gas, which has a remarkable tendency to unite itself with many other substances; and every combustion (attended with the evolution of light and heat) which takes place in the air is an energetic act of such union, while a gentle union of the kind (such as takes place when iron rusts) may be called a slow combustion. Oxygen, however, though thus the great burner and aider of combustion, is itself incombustible.

* *E.g.* of an alkaline carbonate. This resembles the action on food of digestive fluids (see above, p. 159).

Nitrogen, though indistinguishable from oxygen in appearance, has the very opposite properties. It is extremely indisposed to unite with other elements, and, so far from promoting combustion, it stops it—extinguishing a flame plunged into it. It is remarkable also for the extreme instability of the compounds of which it forms a part—such as gunpowder, gun-cotton, nitroglycerine, and iodide, sulphide, and chloride of nitrogen, which form a series of substances successively exploding with greater and greater violence and readiness. Nitrogen, nevertheless, is itself incombustible. *Carbon* is a substance which remains solid even at the highest temperatures yet applied to it, and thus differs extremely from oxygen and nitrogen. It is very abundant as an aëriform rust—*i.e.* united with oxygen or "carbonic acid gas"—but it is rarely found as an element. In that state, nevertheless, it may exist in no less than three conditions. One of these is a crystalline condition known as the diamond. In another condition it is known as black-lead or graphite. Its third condition is what we call charcoal. *Sulphur* also may exist in two conditions—crystalline and non-crystalline—and may be made to pass alternately backwards and forwards from one condition to the other by means of slight changes of temperature. Another element, *phosphorus*, can also exist in two distinct states. One of these is waxy or crystalline, the other is what is called its amorphous condition. Substances which can exist in two or more solid forms are said to be "dimorphic" or "polymorphic." *Hydrogen*, is a gas which is inflammable and burns, but does not support combustion. It is the lightest substance known, and forms a long series of compounds with carbon. They are substances which have for the most part weak affinities, readily disuniting into their constituents when heated by themselves. Hydrogen is very widely diffused, since any given quantity of water can be resolved into twice as much of this gas, by volume, as of that other constituent of water, oxygen. It exists in enormous quantities in the sun, and is known to exist in distant stellar regions.

Aqueous action.

The *vapour of water* is excessively abundant in our atmosphere, especially at a high temperature. Fluid water

has been the great agent in forming the surface of the earth as we see it, and by its unceasing circulation over that surface renders the land a habitable abode for animals and plants. Almost alone amongst inorganic matters in its retention of its fluid form under such wide differences of temperature, it may, considering all the functions it performs, be called the blood of the earth. Water, whether salt or fresh, is ever resolvable into the same relative quantities of its two constituent gases. These are not merely mixed together (as are the oxygen and nitrogen of the air), but are so chemically fused as to constitute a new substance, distinct from either, which may be called the rust of hydrogen. It always contains a greater or less quantity of other substances, and amongst them a considerable quantity of air mixed up within it, and rain-water gathers in its descent some of the air's soluble constituents, including carbonic acid and ammonia. The water of each river contains, of course, the salts of the springs which feed it, and it also contains the matters which it has dissolved out from the soluble materials which it has met with in its course. One of the noteworthy ingredients it thus acquires are, as before said, carbonate of lime * and flint in a state of solution. Sea-water notoriously contains much salt with other chlorides and sulphates, with some ammonia and, an element not hereinbefore mentioned, iodine. The earth's surface is being continually modified, and its elevated parts destroyed, by water in the form of rain, streams, or sea-waves, and by the disintegrating action of ice, which expands as it freezes within the cracks and fissures into which it may have made its way. By these means land is being continually torn down and carried off to be deposited either in estuaries, or at the mouths of rivers, or in the bed of the ocean. The mass of matter thus carried to the sea by some of the largest rivers is enormous. It has been calculated that the Ganges carries down every year as much mud as could be carried down by 730,000 ships, each of

* The Thames carries past Kingston daily not less than 1514 tons of solid substance, mainly derived from the oolites and chalk of Berkshire, Oxfordshire, and Gloucestershire. Two-thirds of this mass consists of carbonate of lime, and thus 140 tons of that substance are on an average annually removed from each square mile of the Thames basin above the town referred to.

1400 tons burthen. The deposit carried down by the Mississippi has formed a delta * extending over an area of 30,000 square miles, and is known to be, at least in some parts, several hundred feet in thickness. Deposits of the same kind are, of course, carried down by rivers into fresh-water lakes, where deltas are also similarly formed. Evidently solid objects, which may fall into such a river, will some of them be carried towards its mouth and then buried beneath successive layers of mud. Should the deposits become hardened into rock, we might expect to sometimes find such objects therein enclosed. Experience abundantly justifies such an expectation. Even impressions made on the once yielding surface by hailstorms, have been preserved by subsequent delicate layers of deposit which have become hardened, the shape of the impressions showing us to-day the direction in which the wind blew at some unimaginably distant period of time. It has been calculated that it must have taken 13,500 years (at the present rate of deposit) to accumulate the thirty-nine feet of Nile sediment beneath the statue of Rameses, and 17,000 years for the corresponding portion of the Nile delta. The eroding action of water is notorious. When the gradient of a river is considerable (as is commonly the case in the upper courses of rivers), its excavating action tends to be considerable also, and if such a gradient be maintained to the coast, the river will excavate a deep channel bordered by heights to its mouth—as in the Tyne and the Tweed. The excavation by a river of its own valley may leave here and there, high up in sheltered positions, accumulations of drifted materials, marking the levels at which the river flowed at successive periods.

Igneous action.

The lowering of the earth's surface by the wear and tear of water, is more or less counterbalanced by a slow or rapid upheaval of other parts of its surface through volcanic action. The number of active volcanoes in the world may be estimated at above three hundred, and some of these give forth vast quantities of lava. For example, in the island of Hawaii a burning deluge of lava broke

* A triangular accumulation of land at the mouth of a river is called a "delta," from its resemblance in shape to the Greek letter so named.

forth, in 1840, from below the crater of Kilauea. It spread from one to four miles wide, and reached the sea in three days, at a distance of thirty miles, and for fourteen days it plunged in a vast fiery cataract, a mile wide, over a precipice fifty feet high. The slow upheaval and depression of different tracts of the earth's surface has been proved by direct observations. The Andes have been rising century after century at the rate of several feet, and the Pampas, on the east, a few inches only.* The land of Scandinavia, towards North Cape, rises at about five feet in a century, and very many other instances could easily be adduced of slow secular elevation. Soundings often give good reason to suppose both that some rather distant islands once formed part of an adjacent continent, and that other islands which by their proximity might be supposed to have been previously united, have not really been so, but have grown nearer together through some recent elevation of coast.

Ocean currents.

But however considerable here and there such changes may have been, it appears that the great ocean and continental areas have been, on the whole, permanent. From the two extremely cold regions of the globe—the greater ice-cap of the south pole and the much smaller one of the north pole—ocean currents extend in variously modified ways towards the equator, while warm currents diverge from the equatorial region towards the poles. The finer débris of the land, carried incessantly down into the seas by all the rivers of the world, is, when the action of the river water ceases, caught up by these great marine currents, and swept to places far beyond the more apparent tidal action. It is only when the seas are enclosed, or when the ocean currents are weak, that the transported materials are quickly precipitated and form deltas. The interest of these ocean currents consists not only in their transporting action, but also in their influence on land climates. Thus, while the cold currents sweeping down from the Greenland seas carry ice and cold water southward along the east coast of America, to lat. 40° N., the Gulf Stream and equatorial current carry warmth with their waters northward to western Europe, even to North Cape.

* Sir Charles Lyell, "Principles of Geology."

Did a belt of land extend between Britain and Greenland, so as to intercept the passage of this warm stream (as the land bounding Behring's Straits stays the passage northwards of the warm currents of the Pacific Ocean), we should then see the mountains of Scandinavia (like those of the coast of Greenland in nearly parallel latitudes) permanently invested with ice and snow. With respect to the volume of the ocean compared with that of the land above its level, it would seem that the former is more than forty times in excess of the latter.

The earth's crust.

The earth's crust is made up of superimposed masses of *strata*, which are various, more or less horizontal, layers of different materials, and consist generally of consolidated mud which has been deposited (in the way described) in fresh or salt water lakes, or in deep or shallow seas. But not all rocks are due to the agency of water. Many masses have been ejected in a molten state from volcanoes, and solidified either on the land's surface or beneath the sea, and, therefore, under great pressure. These rocks, which are thus due to volcanic agency, are called *igneous* rocks. Those formed under sea pressure are termed *plutonic;* otherwise, they are called *volcanic.* Igneous rocks are not generally stratified, and they may be of all ages. Some, like those which form parts of Snowdon and Cader Idris, are very old. Others, like those of Etna and those which cover Herculaneum, are relatively quite recent. Deposits may have undergone five kinds of change. They may have undergone a mere process of drying (as with sand); or drying and pressure (as with sandstone); or heating and pressure (as with some limestones); or with chemical action in addition (as with the highly crystalline rocks, such as gneiss); or a change may have been produced by infiltration. Thus rocks may be infiltrated by iron, lime, or silica, producing ferruginous, calcareous, or silicious sandstones and conglomerates.

The strata thus forming the crust of the earth are supposed to be from sixteen to eighteen miles thick; but no boring has yet extended even one mile in depth, and, indeed, has scarcely exceeded three thousand feet. The total depth, therefore, is purely a matter of inference

from the arrangement, superposition, and inclination of the different strata, as seen at or near the surface. The various strata were, of course, deposited at successive times, and the time of the deposition of each is called its "period" or "epoch." But for subsequent disturbance, the most ancient strata would always be deepest, and superposition would, in all cases, plainly indicate relative novelty. As it is, we have often to examine carefully in order to discover the real order of deposition, but this once discovered, the depth is equivalent to age, and *vice versâ*. The uppermost and most recent accumulations of sands, clays, and gravels, form what is called the "recent deposits;" and these are not counted as forming any part of the proper *geological strata*, and are not represented in ordinary geological maps, but are there disregarded. The strata beneath these deposits are classified in three great groups, belonging respectively to three great epochs. The deepest and most ancient group comprises the strata called *primary*, or *palæozoic*. The second or middle group of strata is called *secondary*, or *mesozoic*. The uppermost and least ancient group consists of strata called *tertiary*, or *cainozoic*. The "recent deposits" really belong to this last-mentioned group, and we may be said to be still living in the tertiary period, which has succeeded the only two earlier periods of which as yet we have evidence—the secondary and the primary periods or epochs.

Each of these three great groups of rocks is made up of a certain number of subordinate groups of strata, or "formations." Thus the *Palæozoic*, or primary rocks, are made up of the Laurentian, Cambrian, Silurian, Devonian, old red sandstone, Carboniferous, and Permian formations. The Laurentian rocks are very largely developed in Canada, and are some 30,000 feet in thickness. The Cambrian rocks are from 15,000 to 20,000 feet thick, and are well seen in the Longmynds of Shropshire, and near Bangor, Harlech, and St. Davids, in Wales. The Silurian strata (sandstones, shales, clays, limestones, and igneous rocks) are of very great thickness, and form a large part of Wales, the lake district of England, southern Scotland, and some parts of Ireland. The Devonian formation is exemplified in Devon

and Cornwall, and the old red sandstone rocks of Ireland, Scotland, and Wales. The Carboniferous formation includes the carboniferous limestone and the coal measures—the latter consisting of seams of coal, sandstone, and shale, such alternations indicating oscillations of level. The Permian formation is of moderate thickness, and mainly consists of magnesian limestone associated with marly slates and beds of conglomerate. In England, it is chiefly found skirting the coal-fields from Durham to Derbyshire. The *Mesozoic*, or secondary rocks, are made up of the Triassic, Jurassic, and Cretaceous formations. The first (Trias)—which includes strata known as the "new red sandstone"—extends in England from Devon to Yorkshire, and is largely developed in Cheshire. The Jurassic rocks contain what are known as the Lias, the Oolite, and the Purbeck beds. The Lias extends from Lyme Regis to Whitby. The Oolite also extends between the north-east and south-west of England. To the upper portion of the Jurassic rocks belong the Solenhofen slates of Bavaria. The Cretaceous formation includes the wealden, the lower and upper greensand, the gault, and the chalk. It is well seen in the south-east of England, where it is considered to represent the delta of a large ancient river, in Kent, Surrey, Sussex, and the Isle of Wight. The well-known chalk, ranges from Lyme Regis to Flamborough Head, and forms both our North and South Downs. The chalk terminates the series of *Mesozoic* formations, and a great break exists between it and the tertiary formations which follow. This break, however, seems to be partially bridged over, in North-Western America, by certain beds known as the "Lignite series." The *Cainozoic*, or tertiary rocks, consist of three formations—the *Eocene*, the *Miocene*, and the *Pliocene*. Eocene rocks underlie both Paris and London, and form very important deposits in North America. The Miocene formation is widely distributed in Europe and the North American continent, but is very slightly represented in Britain. The igneous rocks which form the Giant's Causeway, the islands of Staffa and Mull, and others, belong, however, to this group. The Pliocene formation is extensively distributed in Europe, Asia, and the United

States. In England, it is represented by the Norfolk and Suffolk "crag." The later Phiocene rocks—the so-called Quaternary strata—include the deposits found in the ancient caves of Europe, and those thrown down during what is known as the *Glacial epoch.* That a period of intense cold prevailed, in geologically recent times, over northern and central Europe and the greater part of North America, is shown by the evidences of prodigious glaciers, which have scooped out valleys and ground and scored the surface of hill and dale in those regions. Blocks of stone, called "boulders," are often found there scattered about, and seem to have been transported by ice, sometimes from very great distances.

Fossils.

The various strata which thus form the crust of the earth contain, in different degrees of rarity or abundance, certain objects which are known as "fossils." Amongst the mass of materials carried down by rivers and deposited in their course, or in deltas, or at the sea bottom, are numerous relics of organisms which once lived. Therein have been preserved fragments, or the entire frames, of animals and plants, which have generally been transported for a greater or less distance, and have rarely been entombed in the spots where they lived or died. The plant-remains consist generally of detached leaves, or branches, or fruits, or seeds. Sometimes they consist of tree trunks which have sunk as they became water-logged. Sometimes they consist of parts of tree trunks which have been buried *in situ.* When some organic relic thus becomes entombed, it often happens that particle by particle of the vegetable or animal substance, as it is transformed by chemical changes, is replaced, particle by particle, by mineral matter (ferruginous, calcareous, or silicious), till we have a complete representation—technically called a "pseudomorph"—of the original in the new material. Sometimes, however, we find that plants or even animals have been so enclosed by the mud investing them, that their original chemical elements have been wholly, or in part, preserved, though changed in their arrangement. Altogether, five forms of "fossils" may be discovered: 1. *Objects per se,* i.e. objects which are little changed, or wherein change is subordinate to retention, as

in bones which retain the greater part of their own mineral matter and some of their animal matter also; 2. *Substitutes*, i.e. objects the substance of which has been changed by a process of replacement, as in the mineralization just described; 3. *Moulds*, i.e. deposits which present the impressions made by beings, all other evidences as to which have disappeared —as in preserved footprints, and in moulds of shells or bones which have themselves vanished; 4. *Casts of moulds*, i.e. solid matter which has taken the place of the organic creatures which first made the "moulds" and then disappeared. These "casts of moulds" must have the very shape of the living beings (or parts of living beings) which themselves made the moulds; 5. *Casts of hollow structures*, i.e. mineral masses which have been found within, and have filled the interior of some shell, some hollow bone, some brain cavity, or similar natural hollow of which they are *interior* casts, as "moulds" are *exterior* casts of different organisms or parts of organisms.

From this statement as to the evidence of the past existence of living creatures which are found imbedded in portions of inorganic nature, we may pass on to the consideration of the organic world of animals and plants now living on the surface of this planet.

CHAPTER XXI.

ORGANIC NATURE—PLANTS AND ANIMALS.

All organisms, save the very simplest, are constructed on one of two distinct types—one animal, the other vegetal. Man is formed on one type of one small order of animals, from certain species of which he differs much less than those species do from others of the same order.

Biological classification—Vertebrata—Tunicata, Arthropoda, and Mollusca—Worms, Echinoderms, Cœlenterates, and Sponges—Protozoa—The lowest plants—Phanerogams—Animal, vegetal, and human structure—Common structure of organic nature.

THE study of organic nature—the world of animals and plants—constitutes the subject-matter of "the science of living organisms," or "biology." It is a vast field of inquiry, yet one which here need but be lightly touched upon, since our inquiry is only concerned with it so far as it may serve to elucidate our own nature and our powers of apprehending truth. On account of the great number of kinds of living organisms, it has been found necessary to classify them in an orderly series of subordinate groups successively contained one within the other. Animals and plants are respectively classed in two supreme groups, to each of which the term "kingdom" is fancifully applied, and the arrangement of the sub-divisions of the animal kingdom constitutes one of the very best types of all classification. It is divided into certain very large groups, called *sub-kingdoms*, each of them being again divided into *classes*. Each class is further sub-divided into more subordinate groups, called *orders*, each order into *families*, and each

Biological classification.

family into *genera*; while each genus consists of one or more species.* The classification of plants is essentially similar to that of animals. Every animal and plant has a scientific name consisting of two words; the first denoting the genus to which it belongs, the second pointing out which species of that genus it may be. Thus, *e.g.*, the "Wood Anemone" is called *Anemone sylvestris*, which signifies that it is that species of the genus "Anemone" which is to be distinguished as "sylvestris."

Vertebrata. The highest sub-kingdom of animals (*Vertebrata*), contains those which have a spinal column throughout life,† and consists of the five classes, beasts, birds, reptiles, batrachians (frogs, efts, etc.), and fishes. The class of beasts (*Mammalia*) is made up of a number of orders, amongst which those of man and the apes, the lemurs, the bats, the whales, the edentates,‡ the pouched beasts,§ and the monotremes,‖ may be here mentioned. The facts stated, in Chapter XII., concerning the structure of the human body, may serve to dispense us from giving any detailed anatomical descriptions here, seeing that the various characters by which the different groups of Vertebrates differ, are to be found in all works on comparative anatomy.¶ The order *Primates*, which contains man and the apes so like man in bodily structure, is made up of three families. The first includes man only; the second comprises the apes of the old world; and the third family, those which are confined to America. Amongst the old world monkeys are the specially man-like, or "anthropoid" apes, namely, the chimpanzee, gorilla, orang, and the long-armed apes. These animals differ less from man in structure than they differ from the lowest kinds of monkeys. Of the order of lemurs may be

* The question as to the real existence and nature of species, genera, families, orders, etc., will be considered in Section V. chap. xxv.

† Thus differing from the *Tunicata*. See below, p. 318.

‡ These are the sloths, ant-eaters, armadillos, pangolins, and the aard-vark, or orycteropus, as well as the extinct *Mylodon*, *Megatherium*, and *Glyptodon*.

§ Or marsupials. They include the true opossums of America (*Didelphys*) and almost all the mammals of Australia.

‖ Monotremes (the order *Monotremata*) include only the duck-billed platypus or *Ornithorhynchus* of Australia, and the echidna of Australia and New Guinea. These two animals differ greatly from all other beasts. Even the nature of their milk-glands has been found to be exceptional.

¶ See, amongst others, the author's book on "The Cat" (John Murray).

mentioned the aye-aye, the slow lemur (*Nycticebus*), and the potto (*Perodicticus*), which last has the index finger quite rudimentary. Of birds there are upwards of ten thousand known kinds, the more exceptional of which are the ostrich and its allies, including the Apteryx of New Zealand. The class of reptiles is divided into four well marked orders of existing species, namely (1) crocodiles, (2) lizards, (3) serpents, and (4) tortoises. In the class *Batrachia* (frogs, toads, efts, and ophiomorpha),* we meet with animals which in some respects differ notably from the creatures of all the before-mentioned classes. Certain kinds of efts, such as the *Siren* and *Menobranchus* of North America, and the proteus of the caves of Istria and Carniola, not only possess lungs, but also other organs known as "gills" or "branchiæ." These are delicate processes of skin attached on either side of the throat to certain solid arches, called "branchial arches," separated by clefts, and which correspond with the "visceral arches and clefts" before noted † as existing for a time in the human embryo. As in that embryo, so in these batrachians, the arteries which proceed from the heart take their course along these arches. There they branch out and richly supply the gills with blood, and then pass on to the main artery of the body which runs backwards beneath the spinal column. In the half-developed frog, or tadpole, the conditions are for a time similar, though at first it has no lungs, while, as it becomes fully formed, it ceases to have gills. Amongst fishes we find no lung, save in one or two very exceptional forms (*Ceratodus* and *Lepidosiren*), but there are always gills attached to branchial arches along which the blood vessels are distributed in essentially the same way as in the gilled efts. In beasts, birds, reptiles and batrachians, the skeleton is formed of bone and the backbone of vertebræ, as in man; but in many fishes—sharks, rays, lamprey, etc.—the skeleton is cartilaginous. In some—as *e.g.* the sturgeon—a continuous soft structure takes the place of vertebræ, recalling to mind the notochord ‡ of the human embryo.

* Limbless creatures, in external shape like earthworms, found in the warmer regions of the globe.

† See above, p. 173.

‡ See above, *loc. cit.*

This is especially the case in the lancelet (*Amphioxus*), which is by far the most exceptional of all fishes with respect to the simplicity of its structure, and differs from all other Vertebrates in having no distinct head, and only a tubular heart.

Tunicata, Arthropoda, and Mollusca.

We may next pass to a small sub-kingdom, TUNICATA, which includes certain marine organisms, of very simple structure, known as sea-squirts, or ascidians. Some kinds are noteworthy because, when young, they are provided with a long tail in which there is a kind of temporary spinal column or notochord,* having on its dorsal side (as in vertebrates) the central part of the nervous system. The sub-kingdom which is by far the richest in species is named ARTHROPODA, and includes all insects, scorpions, spiders, and tics, centipedes, shrimp-like creatures, barnacles, and very peculiar parasites called *Rhizocephala*. Arthropods generally have the body formed of a longitudinal series of more or less similar segments, many of which are provided with a pair of "lateral appendages," which may be nearly all alike, as in the centipede, or may, as in the lobster, be variously modified in different regions of the body to form feeling-organs, jaws,† legs, or paddles. Thus we find in this sub-kingdom the best examples of "serial symmetry." None of these creatures have an internal skeleton. The sub-kingdom *Arthropoda*, and all the rest of the lower animals are formed on quite different types of structure from that which characterizes the *Vertebrata*. On this account all these lower animals are often spoken of as *Invertebrata*, although some groups of them may differ as much or more from others, than they differ from Vertebrates. Another large assemblage of animals constitutes the sub-kingdom MOLLUSCA. It contains the class of cuttle-fishes, the nautilus, etc., or Cephalopods, together with snails, whelks, limpets, the oyster, mussel, and a multitude of allied forms. They are animals the bodies of which are not segmented. They present hardly a trace of serial symmetry, and even lateral symmetry is often wanting.

* See above, p. 173.

† The jaws of an Arthropod do not bite vertically (as do those of a Vertebrate), but laterally. There may be three successive pairs of true jaws, followed by others which are partly like feet, as in the lobster.

Though generally possessed of a shell, there is no internal skeleton, save that in a few forms—*e.g.* the cuttle-fish—there is an internal shell, and a cartilaginous case partly protects what may be called the brain, and so far simulates a "skull." Another group of animals the position of which is not yet certainly determined, are the Brachiopods, called "lamp-shells" because they bear a fanciful resemblance to an ancient lamp.

Worms, Echinoderms, Cœlenterates, and sponges.

A great variety of classes (including many kinds of worms), the arrangement of some of which is also far from finally settled, need here be referred to but in the very briefest manner. Such are the Annelida (earthworms, leeches, etc.), the Bryozoa (or Polyzoa)—minute animals living in compound aggregations, such as the well-known sea-mat (*Flustra*) of our coasts, a number of internal parasites and some allied forms which are not parasitic, and, lastly, the wheel-animalcules which form the class *Rotifera.*

One sub-kingdom of animals is termed ECHINODERMA, and includes all star-fishes, sea-urchins, brittle-stars, sea-cucumbers, and crinoids. Although essentially simple in structure as regards systems of organs, Echinoderms may, nevertheless, consist of a prodigious number of juxtaposed parts—as *e.g.* does the sea-urchin. The well-known animal called the sea-anemone (*Actinia*) is a type of the sub-kingdom CŒLENTERA, in which are classed all the coral animals and other zoophytes, including the *Hydra.* The last-named animal consists of a sack containing but one cavity, with one aperture—the mouth—surrounded by tentacles. The body wall consists of two layers, each composed of a multitude of cells, those of the outer layer sending prolongations inwards which appear to consist of nervous and muscular tissue in a most simple condition. Cœlenterates and many adult Echinoderms have the parts of the body so arranged as to diverge in different directions from a centre ; thus affording us an example of a new kind of symmetry, which may be distinguished as *radial symmetry.* The sponges (SPONGIDA) have the body (which contains many silicious, calcareous, or horny parts) also formed of two layers of cells, amongst which some

contractile fibres and nervous cells have been asserted to exist. Sponges are very exceptional, in that they generally possess a greater or less number of inhalent and exhalent apertures. In a certain anomalous parasitic animal called *Dicyema*, the body consists of an outer layer of cells surrounding one large central cell extending the whole length of the body.

Protozoa. The lowest sub-kingdom of reputed animals, the PROTOZOA, is made up of the animalcules known as *Infusoria*, minute parasites termed *Gregarinida*, and a multitude of forms known as the *Rhizopoda*, which have the power of projecting and retracting portions of their body called pseudopodia or "false feet." In all the Protozoa the body is most simple. Very many of them consist of but a single cell. In those even which are multicellular there is but a simple aggregation of cells, and no definite arrangement of them in two layers, still less is there any formation of distinct "tissues." The most beautiful of the Rhizopods are the marine *Radiolaria*. Another group, the *Flagellata*, consists of minute creatures which swim about by means of one or two whip-like processes (whence the name of the group) which resemble the vibratile cilia before spoken of* in describing the human body. Last of all comes the group of the FORAMINIFERA, so called because most of them protrude their pseudopodia through minute holes, or "foramina," in the calcareous shells which enclose them, and which they secrete and build up, although they otherwise consist of nothing but a minute particle of apparently structureless jelly or protoplasm.† Some species, however, are naked. Amongst these is the *Amœba*, which so singularly resembles a white corpuscle of human blood.‡ None of the Protozoa can have organs answering to those of any higher animals, because the organs of such higher animals are formed of distinct tissues. Nevertheless these unicellular organisms sometimes possess parts which simulate the organs of their betters—cavities with pulsating walls, and parts which can suddenly contract as if formed of muscular tissue. If these creatures are truly animals, they are the lowest members of the animal kingdom, and lead

* See above, p. 158. † See above, p. 147. ‡ See above, p. 157.

us by narrow steps to the lowest members of the kingdom of plants.

The lowest plants.

The lowest plants constitute the two great groups of water weeds (*Algæ*) and of moulds (*Fungi*). Amongst the latter are those minute organisms, *Bacteria*. Very many of the lowest plants are unicellular, like *Protococcus*, which moves about by means of vibratile cilia, while *Volvox*, a spheroidal aggregation of cells, swims by the action of the cilia which extend outwards from its component particles.

The seaweed *Caulerpa*, which abounds on some coasts, and whereon turtles browse, consists but of a single cell, though its shape is so complex that it simulates in outline the fern called *Blechnum*. The microscopic plants known as Diatoms and Desmids are Algæ, as also are those thread-like organisms which, on account of their remarkable and as yet unexplained movements, are called *Oscillatoriæ*. Many of the lowest plants closely resemble some of the Protozoa. This is especially the case with *Myxomycetes* during a portion of its cycle * of life.

Lichens, liverworts, scale-mosses, *Chara* and *Nitella*, true mosses, lycopods, horsetails, and ferns, together constitute the rest of the lower primary division of plants—the Cryptogams, or flowerless plants. The other primary division—Phanerogams—is subdivided into the *Gymnosperms*, a small section to which all firs, pines, yews, and cycads belong; and the *Angiosperms*, a group including all the plants which possess conspicuous flowers. Two plants are, for our purpose, specially worthy of note. These are the sun-dew (*Drosera*) and Venus's fly-trap (*Dionæa*). The former grows on bogs, and has the upper surface of its foliage leaves furnished with long glandular hairs which can discharge a tenacious fluid. The latter has foliage leaves which terminate in two rounded plates joined by a median hinge. Very strong bristles project from the margin of each of the rounded plates just mentioned. The actions of these structures will be considered further on.

Phanerogams.

At the base of the organic world are a number of simple organisms, alike devoid of nervous or muscular tissue and of any permanent internal digestive cavity. These lowest

* See above, p. 164, and below, chap. xxii., "The Cycle of Life."

forms constitute the Protozoa and the lowest division of the kingdom of plants. Thence, as it were from a common starting point, the two kingdoms of organic life may be said to diverge. The animal kingdom advances in complexity from a structure resembling a double-walled sack with a permanent digestive cavity, and possessing nervous and muscular tissue. The vegetable kingdom advances in complexity in a quite diverse mode, building up a variously branching axis with foliar organs (modified leaves), but always devoid of any alimentary cavity or any form of muscular or nervous tissue.

Man, vastly as we shall find him to differ from every other organism with respect to his higher faculties, is nevertheless, when considered exclusively as regards his bodily structure, only a genus of one of the three families which constitute the order Primates.

Animal, vegetal, and human structure.

We have now, as a conclusion to this chapter, to note those characters of form and structure which distinguish the living, organic world of nature—all plants and animals considered as one great whole—from that inorganic nature to a consideration of which the preceding chapter was devoted.

Common structure of organic nature.

Multitudinous and varied as are the creatures which compose the organic world, they nevertheless exhibit a very remarkable uniformity of composition and essential structure. Creatures the most various, from man to the smallest fungus which may attack his crops, exhibit a fundamental * uniformity in their physical composition. Every living creature has a body which, however soft it may be, however much fluid it may contain, or however hard and dry it may appear, is never entirely fluid, and is always partly so.† Every living creature consists in part (and that part is the most actively living part) of that soft, viscid, transparent, colourless, nitrogenous substance, "protoplasm," ‡ of which every living creature is, at first, entirely composed. Herein we have a first difference between the organic and the inorganic world, and this involves a second

* Not absolutely similar, however, as is proved by differences of activity—notably of development.

† In the body of a jelly-fish, no less than ninety-nine parts of a hundred are composed of water.

‡ See above, p. 147.

difference. For we thus see that a great uniformity of chemical composition runs through all organic nature, since every organism is mainly resolvable into the protoplasmic elements, oxygen, hydrogen, nitrogen, and carbon, whereas inorganic bodies may consist of the most diverse elements from those which compose organic bodies, and of a greater or less number of them—often of but two, and sometimes of but one. There is also a yet further chemical difference. This consists in the diversity of the proportions in which the constituent elements appear to be combined in organic and inorganic bodies; being very much more complex in the former.

Again, crystals are bounded by plane surfaces, or "faces," which meet at definite angles, which respectively characterize different mineral species; while with one or two exceptions (such as spathic and hæmatite iron, and dolomite) mineral bodies are not bounded by curved lines and surfaces. On the other hand, curved lines and surfaces are the characteristic boundaries of all animal and vegetable bodies. Again, if a crystal be cut through, its internal structure will be seen to be similar throughout. But if the body of any living creature be divided, its interior almost always exhibits definite structures made up of different substances; while even the very simplest living creature shows, when thus divided, a variety of minute, distinct particles, called granules, variously distributed throughout its interior. Other still more important distinctions which characterize the organic and inorganic worlds respectively, consist in differences in actions and active powers, and will come under our consideration in the next chapter on the "functions," that is the activities, of organisms.

In every separate organism, whether animal or vegetal, there is a continuity of structure comparable to that which we have seen * exists in the human body. Similarly, also, each such organism may be considered, like the body of man, to consist of one more or less large and internally complex and differentiated cell, which has arisen, by multiform processes of cell-division, from those primitive cells, or portions of cells, which constitute the starting points of both asexual and sexual generation.

* See above, p. 151.

CHAPTER XXII.

THE FUNCTIONS OF ORGANISMS.

The functions of sustentation and reproduction are common to all organisms, but differ widely in plants and animals. Those of muscular motion and feeling are specially animal faculties. Man is functionally, no less than structurally, a true animal, predominantly resembling the other members of his order of the class Mammalia.

Properties of protoplasm—The cycle of life—Income and outcome—Spontaneous generation—Structure and function—Distinctions between animals and plants—Formation of organic matter—Plants do not feel—Alimentation—Circulation, respiration, secretion, and reproduction—Development—Heredity—Man and other organisms.

WE have just seen (in the last chapter) that the whole organic world of plants and animals differs from the inorganic world by certain structural characters. It is of course, however, by their active powers that organisms mainly differ from inorganic bodies. The powers exercised by—in other words, the functions common to—all organisms will, then, here first be shortly passed in review, and afterwards the more special activities possessed by organisms of different grades will be briefly adverted to. It may be well for the reader, before applying himself to the present chapter, to reperuse what has been said* about "the activities of the human body," since the active powers possessed by all organisms and those peculiar to the higher animals, have necessarily been already noticed in what has been said about man. We have already seen† that the human

* See above, chap. xiii., p. 154. † See above, p. 147.

body is made up of systems of organs, of separate organs, of tissues, and of cellular elements; the latter being those protoplasmic units forming the ultimate parenchyma of the body, and many of them resembling not a little those lowly organisms known as *Amœbæ* and *Flagellata*.* We have also seen, in our thirteenth chapter, that certain activities, or functions, must be possessed by our body's protoplasmic elements, since otherwise assimilation, respiration, secretion, and motion, as carried on by the human body, could not there be carried on. Evidently our body could not live and grow had not its ultimate constituents also a power of augmenting in size and spontaneously dividing, whereby the augmentation of the whole mass of the body is effected.†

Properties of protoplasm.

These facts being premised, the powers exclusively possessed by the organic world, and common to all organisms, without exception, may next be stated. As has been said more than once, all organisms contain or consist of protoplasm, and it is noteworthy that this very unstable substance always contains the explosive element‡ nitrogen. The differences, then, which exist between the properties of living protoplasm and all inorganic matter are as follows:—

1. Currents are commonly established in inorganic mixtures by differences of temperature, but in a portion of protoplasm, an internal circulation of currents may continue in definite lines (as indicated by particles within it), without altering the external figure of the organic particle in which they occur.

2. Inorganic bodies expand with heat, or through imbibing moisture; but living protoplasm has an apparently spontaneous power of contraction and expansion under certain external conditions which do not occasion such movements in inorganic matter.

3. Under favouring conditions, protoplasm has, and therefore organisms have, a power of performing chemical changes, which result in producing heat far more gently and continuously than it is produced by the combustion of inorganic bodies.

4. Protoplasm has also the power of converting certain

* See above, p. 322. † See above, p. 163. ‡ See above, p. 306.

adjacent substances into material like itself—into its own substance—and so, in a sense, creating a new substance, as in nutrition.*

5. It has thus the power of growing, not by a mere external increment—as a crystal so grows when suspended in a suitable medium—but, as before pointed out, by a special process of internal increment known as "intussusception." †

6. Protoplasm, after thus augmenting its mass, has a further power of spontaneous division whereby is augmented the mass of the entire organism of which such protoplasm forms a part—whereby, that is, it grows.

7. It has also a power of freeing from its own substance, substances both different from its own and from substances adjacent to it—that is, a power of secretion.‡ Thus it is that, since every living creature consists at first entirely § of protoplasm, every other kind of substance found in every animal or plant comes, and must come, from protoplasm, and is formed, and must be formed, by its agency.

8. Living protoplasm has, further, a power of exchanging gases with its environment—notably of absorbing oxygen and giving out carbonic acid, as in respiration. ‖

9. No particle of protoplasm can persist unchanged like many inorganic substances. In order that it may continue to subsist, it needs to be supplied with material which it can assimilate—in other words, it must feed.

10. Lastly, protoplasm has a natural power of motion under stimuli,¶ and is capable of altering its external configuration by alternate protrusions and retractions called "amœbiform" motions.** Similarly it may so move its parts as to produce a flowing motion of its whole mass; as in the movement of *Myxomycetes*,†† and as in that of the protoplasm contained within the cells of the plants *Chara* and *Nitella*,‡‡ which flows round the interior of such cells with a movement sometimes called "rotation" and sometimes "cyclosis."

* See above, p. 159.
† See above, p. 160.
‡ See above, p. 162.
§ See above, p. 322.
‖ See above, p. 161.
¶ On a stimuli, see above, p. 155.
** See above, p. 157.
†† See above, p. 321.
‡‡ See above, *loc. cit.*

These exclusively vital powers of living particles of protoplasm are also, of course, possessed by the very simplest unicellular plants and animals. More complex organisms likewise, of course, possess them, and they possess other powers in addition, by which they also differ from the whole inorganic world.

The cycle of life.

Their most important difference of function, consists in the innate tendency they possess to undergo a definite cycle of change. The inorganic world is commonly, and indeed truly, spoken of as a world of dead, relatively inert matter; and yet it is a world of active and incessant change. For, apart from oceanic waves and currents, the flow of rivers, and the circulation of winds; apart from volcanic action and changes in the shape and elevation of parts of the earth's solid crust, terrestrial matter continually thrills with electric, magnetic, thermal, and chemical changes, as well as probably with many others, which neither the senses nor wit of man have yet enabled him to detect. But however vast or complex the changes which take place may be, they never take place in any non-living body in a regular and recurring order. They never form a series returning upon itself and reproducing any state which we may have selected to regard as the initial state in a "cycle" (or recurring series) of changes.

Very different is the behaviour of living bodies. Thus, a bird's egg will in due time give rise to a bird, which may again produce an egg; or a silkworm will become a chrysalis, which will disclose itself as a moth, the moth will lay eggs, and these, when hatched, will once more present us with the form of the silkworm—our starting point in the second case. It is the same with a fruit, the seed of which may be sown, producing in its turn a plant which grows and flowers, the flower maturing into the fruit once more. The changes, then, which take place in living bodies tend to form a cycle. In order, however, that they should thus recur, certain conditions are necessary. Thus, as every one knows, a bird's egg will not be hatched without heat, nor, if duly heated, will it be hatched if it be kept in an atmosphere of nitrogen or of carbonic acid, or in any atmosphere which is deprived of either oxygen or moisture. It

will not be hatched even in a suitable atmosphere, if its shell be coated over with grease or any other material capable of cutting off its contents from the action of the air external to it. The cycle of changes will also be interrupted if the hatched bird be deprived of needful nourishment or warmth, and analogous adverse circumstances will interrupt the series of changes in all cases. Thus the cycle of changes which take place in living bodies can take place only under certain fixed conditions—such as a certain temperature, the access of requisite gases, a certain degree of moisture, and enough nutrition. But let such conditions continue to be supplied, and the cycle of changes appears capable of indefinite recurrence. If, however, perfectly similar conditions be supplied to organic bodies which have ceased to live, a regular series of changes also takes place; but such changes do not form a cycle—they never return to the point from which they set out. They are the changes of decomposition, and ultimately result in the formation of inorganic substances, such as water, ammonia, carbonic acid, sulphuretted hydrogen, various earthy salts, etc. Thus, the existence of an innate tendency to go through a definite cycle of changes when exposed to certain fixed conditions, forms a distinction, not only between mineral substances and living organic bodies, but also between the latter and organic bodies which are dead.

Inorganic substances tend simply to persist as they are, and have no definite relations either to the past or to the future. What a mineral may have been, or what it may come to be, is nothing to its present being—which is its *only* being. But every living creature, at every stage of its life, regards both the past and the future, and thus lives continually in a definite relation to both of these, as well as to the present. Every stage of its cycle of life, just because it *is* a cycle, is conditioned by the anterior states which alone have made its existence possible, and refers to future states for which it is in active preparation. Thus, the life of all organisms—as will more fully appear in our twenty-fourth chapter—is ever in close relation with external circumstances; and, in order to live, must be able to actively respond in an adequate degree to the influences

and circumstances of its environment. A crystal or a nugget of gold may lie passive for ages and yet preserve its existence unimpaired. Not so an organism. With it, to cease to change is to cease to live, and if changes are made by it which are out of harmony with the surrounding circumstances (if, *e.g.*, an antelope runs toward a lion instead of away from it) it will also cease to live. Similarly, when an organism takes in food, there must go on, in order that it may live and grow, a due adjustment of its internal relations to the new influence brought to bear upon it. Thus, every living creature has a unity, as shown by its active powers, of a very different kind to that of any inorganic body. It has an immanent spontaneity of action on the occurrence of stimuli under due conditions. An inorganic body may be one kind of substance, but only a living organism can merit to be called an *individual.*

Income and outcome.

In order, then, that any living organism may preserve its integrity, there must also go on within it simultaneous changes of composition and decomposition, definite in character and properly combined for the proposed end—the preservation of its life. There must be a definite and conservative combination of simultaneous and successive changes. The active processes of life which relate to the preservation of the individual, may be shortly described as a double process of absorption and elimination—of *income* and *outcome.* These words denote the extreme terms of the double series of intermediate changes which are necessary for the conservation of each individual organism's life. But all living creatures, normally constituted, have not only a faculty of maintaining their own existence for a longer or shorter time, but they have also a faculty for providing for the perpetuation of their kind, and thus the fundamental powers of all organisms without exception, may be said to be of two kinds—a power of self-maintenance, and a power of reproduction. Moreover, all living beings not only agree in that they (from man down to the lowest fungus or alga) start in life as a minute spheroidal mass of protoplasm, but they also further agree as to the general process by which they attain a complex, adult condition, with distinct parts and organs—if they attain

such a condition at all. The process is one of budding repeated in various ways, the buds themselves developing and becoming metamorphosed. Whether the creature be an oak-tree or a butterfly, the mature form is gradually attained by minute outgrowths and separations, about which more will shortly be said. Sooner or later the double series of conservative changes which take place in every living being cease to be carried on in perfect adjustment; and this inevitable defect also, in every case, sooner or later culminates, and the death of the individual ensues—such death being the natural end fatally predetermined in the life-conditions of each kind of organism.

Spontaneous generation.

But seeing that every living being ceases sooner or later to live, and that every organic structure is fated to become mere inorganic matter, have we any evidence of the existence of the contrary change—the change from inorganic, not-living substances into organic, living beings? Now, as we shall shortly see, certain organisms—the great majority of plants—have the power of building up living organic matter directly from the inorganic world, but they effect this by means of matter which is itself living and organic. The question, therefore, which remains is, do living beings arise without the help and intervention of creatures which already live? Three hundred years ago it was the universally received opinion, that many of the lower animals (such as certain flies, worms, and internal parasites) arose without the intervention of a parent organism of any kind. But the discoveries which have one after another been made concerning the life-history of such creatures, have successively reduced the number of organisms which might be supposed so to originate to a few of the very simplest and minutest kinds. Even as regards these, the patient and apparently exhaustive experiments of Pasteur and others seem to have successfully refuted every assertion of "spontaneous generation." Men of science are now generally agreed* that there is no trustworthy evidence of living creatures coming into existence save by the intervention of parental organisms. The spon-

* This agreement has largely been brought about by the invaluable labours of M. Pasteur.

taneous evolution of living things from things devoid of life, is contrary to all our experience. This constitutes a final and decisive limitation between the two realms of organic and inorganic nature so far as our knowledge at present extends.

As was stated in the last chapter, all living creatures save the unicellular ones, consist of aggregations of particles of protoplasm, or cells, and such aggregations have powers which exceed those of the several particles of protoplasm which build them up. Thus a *Volvox*,* by means of the cilia of its component cells, has a more developed and complex power of motion than has any one of the particles which compose it. As we have seen to be the case with man,† so the other multicellular organisms are formed of tissues—that is, of aggregations of aggregations of particles or "cells." In an earth-worm, an oyster, or a flowering plant, the body is so composed. But just as a *Volvox* has powers which exceed the properties of its component particles, so each aggregate of particles, or cells, forming a "tissue," has powers which exceed the properties of its component particles.

Structure and function.

Now, scientific experience justifies us in affirming it to be an absolute law, that every structural difference which may exist between any two parts of a living being, is accompanied by some difference between the modes of activity (functions) of such two parts; and every difference between the modes of activity of different parts is also accompanied by some corresponding difference in their structure. Thus "structure" and "function" vary together.

It follows that each tissue, having its own peculiar structure, has also its own special and peculiar function, different from the functions of the other tissues. The same consideration applies to each organ and each system of organs wherever such distinctions exist—as we have already found them to exist with respect to tissues, organs, and system of organs of the human body.

Distinctions between animals and plants.

In the last chapter we have seen that there is a great difference between the structure of all animals above the Protozoa and the immense majority of plants. We may

* See above, p. 321. † See above, p. 147.

therefore expect to find that there are corresponding functional differences.

The distinctions which exist between all the larger and better known forms of plants and animals are, indeed, so obvious that (in spite of the characters common to both, which have been pointed out) the reader may think it to be very easy to divide them as to their functions in an absolute manner. For the activity of the animal creation forces itself constantly upon our attention; while plants, for the most part rooted to the soil, are obviously incapable of voluntary motion. Yet many plants, like the sensitive plant, do make certain movements, in order to disseminate their seed or their pollen, or under different conditions of light—as the flower of a pimpernel will shut up under a clouded sky. Every one knows that different flowers close at different hours, and thus Linnæus was able to construct what was called "a floral clock." The movements of tendrils are also well known. Again, many of the lowest plants, such as Protococcus and various allied forms, are actively locomotive—at least in certain stages of their life-history, and the curious alga, *Oscillatoria*,* is in almost constant motion. On the other hand, many Tunicates † are very inert, and the Sponges are apparently motionless. The plants the motions of which are, for several reasons, the most noteworthy, are the sun-dew (*Drosera*) and Venus's fly-trap (*Dionœa*). The hairs of the leaves ‡ of the sun-dew not only secrete a sticky fluid by which an insect accidentally alighting is caught, but they will gradually bend over such a captured insect, so imprisoning it more effectually while bathing it in the fluid they distil. When an insect alights on the leaf of Venus's fly-trap, its contact causes the two plates of the leaf § to snap sharply together and so imprison it, and the more the insect struggles to escape, the more tightly the plates close upon it till it is killed. The insect being dead, the blades of the leaf again open and prepare to receive another victim. If, however, the insect seized be very small (so that it is not

* See above, p. 321. It performs a series of alternate contractions producing more or less rapid inflexions of the whole structure, like the bendings of a worm or eel, and these inflexions may continue for days uninterruptedly.

† See above, pp. 318. ‡ See above, p. 321. § See above, *loc. cit.*

worth the effort of holding and killing), the plant's grasp is quickly relaxed, and its prey allowed to escape. There is a very curious imitation of voluntary motion in the fruit stalks of the "mother-of-a-thousand" (*Linaria*), which will move about over a rock or wall till it comes to a suitable depression or hollow, when it will plunge its fruit (capsule) within it and there deposit its seed. We have, however, already seen that mere isolated particles of living protoplasm have a certain power of motion when stimulated, and it is, therefore, not so very surprising that a certain kind of motility should exist in plants. But the special form of motility which results from muscular contraction is only found in the animal kingdom, for in no plant is there such a thing as muscular tissue, and therefore the movements of these vegetable organisms are essentially unlike the movements, whether voluntary or involuntary, which we observe in animals.

Formation of organic matter.

A more obvious functional distinction is supplied us on the matter of nutrition. Let any animal be supplied, however abundantly, with all the constituent chemical elements which go to form its body (either separately or arranged in whatever artificial combinations), such animal must inevitably die of starvation, for it cannot build up its own substance—cannot compensate for the wear and tear of life—by any amount of inorganic matters alone. It can only nourish itself when supplied with food consisting of matter which forms or has formed part of a living creature. Therefore, no animal can live without feeding directly or indirectly upon plants, which do possess the power of building up organic matter directly from the inorganic world. They do this by means of their green leaves, which, furnished with a substance termed chlorophyll, have the power, in sunlight, of dissolving carbonic acid, retaining its carbon, and letting its oxygen go free. This is the opposite process to that already described as respiration*—a process which takes place in all organisms, whether plants or animals. Certain worms (some of those known as *Planariæ*) and some other animal organisms more or less green in colour, can also dissolve carbonic

* See p. 161.

acid as plants do, but this is by no means their exclusive or chief mode of nutrition and growth. On the other hand, the great group of Fungi, as well as certain parasitic plants —such as the Dodder and *Rafflesia* *—are devoid of this power, and need, as animals do, organic matter for their sustentation. With these trifling exceptions, however, the whole vegetable world, forests, grassy plains, sea-weeds and mosses, and the green threads of every pond and rivulet, are one and all continually engaged, during the hours of daylight, in tearing from the atmosphere its carbon and in absorbing moisture, in order to build up new masses of organic substance from these purely inorganic materials.

Again, plants do not receive solid nutriment into an internal cavity, as almost all animals do. But there are undoubted animals (*e.g.* the tape-worms) which have no such cavity, but imbibe their nourishment directly through the external surface of the body; while there are undoubted plants—*Drosera* and *Dionæa*—which not only catch insects but digest them (by means of a digestive product they secrete) in a sort of temporary quasi-cavity. In the case, also, of the pitcher plant (*Nepenthes*) insects are caught and decomposed in its "pitchers," which are permanent sacks, though they do not answer to the digestive cavity of any animal.

Plants do not feel.

The last and most important functional distinction between plants and all undoubted animals relates to the faculty of feeling. Animals, down to and including, it is said, sponges, have some form of nervous tissue, and, as we shall see, very commonly some organs of special sense. Animals are creatures which get their living by the help of their senses, while plants are senseless; and an animal may be said to be an arrangement for carrying about, and for a time perpetuating a plexus, or bundle, of sensations. Not only will a worm or slug shrink from any irritating object, but will by its contortions give signs of feeling pain which (its nervous centres being uninjured) we have no reason for otherwise interpreting. Most animals also can perceive

* A parasite of the Indian Archipelago, devoid of foliage leaves, but with a flower nine feet in circumference and weighing fifteen pounds.

objects more or less distant, and can appreciate sounds and sights (if not also odours), as well as touches, by special sense-organs formed for such ends. There are animals, indeed, which seem hardly to show any signs of feeling, such as Hydatids.* They, however, are but creatures in an imperfect stage of development, and no animals, however high, exhibit evidences of sensitivity at a very early period of their existence. Sponges also give little sign of possessing such a faculty, but then any nervous tissue they may have is of a most rudimentary and imperfect kind. On the other hand, there are plants the actions of which might lead some persons to believe they had not only sensation, but even reason and will also. Amongst them may be enumerated *Drosera* and *Dionæa*, especially as regards the action by which the latter plant affords to its useless and insignificant prey, a means of escape by opening its leaf blades. Very curious also are the methods by which the roots of plants seem to "feel," as it were, after moisture,† and those by which the tendrils of certain climbers seem to search for some fitting support and, having found it, to cling to it by what might seem a voluntary clasping, while they will avoid the stem of the plant from which they spring, by actually raising themselves, if need be, upright, to pass over it.‡ We may here again refer to the action of *Linaria*, which has the appearance of feeling for a cavity wherein to deposit its seeds.§

* Certain immature internal parasites.

† A sycamore tree at Penn, near Wolverhampton, sent down into a well to reach the water, a root forty-four feet long and about a quarter of an inch in diameter.

‡ The tendril of a passion-flower may sometimes be made to bend by the pressure on it of a thread weighing no more than $\frac{1}{3\frac{1}{2}}$ of a grain, or by merely touching it for a time with a twig. If, however, the twig be taken away again at once, the tendril will then soon straighten itself. Yet neither the contact of other tendrils of the same plant, nor the falling of raindrops, will produce such bendings. The mistletoe as it germinates does not send its root-like outgrowths downwards, but inwards into the supporting plant upon which it is to live. Dutrochet showed that this special direction of growth was not due to any merely physical attraction. He mounted the seed of a mistletoe upon one extremity of a very delicately balanced needle, which would turn with the slightest force, and he placed it at the distance of half a line from the surface of a large cannon-ball. In germination the root-like outgrowth made directly towards the ball, and soon came in contact with its surface. Nevertheless, the end of the needle to which the seed was attached had not moved in the slightest degree towards the ball, as it would have done if the action had been due to an attraction such as that of gravity.

§ See above, p. 333.

In the case of feeling, however, as in the case of motion, whatever impressibility may exist, must be of a different kind from the sensitivity of animals, because it is the function of an essentially different kind of tissue. It is not an activity due to any form of nervous tissue, for none exists in any plant. It is, therefore, only the outcome of combinations of cellular and other vegetable tissues.

The functions, then, which minister to self-preservation and reproduction are functions common to all organisms —to plants as well as to animals—and they are therefore known as the *vegetative functions*. The functions of muscular motility and of sensitivity on the other hand, are functions which pertain only to organisms which are undoubtedly animals.

The consideration of all that concerns these animal functions will be deferred to the next chapter, and what remains of the present one will be devoted to a brief notice of the functions common to all organisms, and especially to reproduction and development.

Alimentation. The great function of nutrition (alimentation), as it is carried on in man, has been already described.* It is essentially the same in all undoubted animals, with the exception of those parasites which imbibe their nourishment through their external surface. In the Protozoa—as, for example, in *Amœba*—particles of solid food are treated as follows: the spot at which the animal touches such a particle becomes depressed, the substance of the body around such depression then grows round it, meets, and encloses it; and the undigested residue is subsequently expelled at some temporary opening formed for the occasion. The long and delicate pseudopodia † of many Protozoa close round some particle of food, coalesce, draw it inwards, and so engulph it in the creature's body. The nutrition of plants is effected in a manner very different from that of animals, but space cannot here be afforded for its description.

Circulation, respiration, secretion, and reproduction. The great functions of circulation, respiration, and secretion are essentially the same in all organisms as in man, though the various modes in which those functions

* See above, p. 158. † See above, p. 320.

are effected vary extremely, in harmony with the great divergences as to structure which exist between different groups of organisms. As to the function of reproduction, a few more words must be said.

We have already seen how in our own species not only ordinary growth, but a reproduction of lost parts,* may take place, involving remarkable organic adaptations and noteworthy instances of correspondence between one part and another. But the amount of reproduction of lost parts which may take place in many of the lower animals is far greater. Thus if the tail of a lizard be broken off it will grow again. If it be longitudinally divided without being removed, each divided half will complete itself, and this process has been repeated till a lizard has been made to carry sixteen such tails. The limbs of efts will also be reproduced with their bones, muscles, blood-vessels, and nerves. Even the eye and lower jaw have been seen to be reproduced in the last-named animals, and one from which the greater part of the head had been cut, was in the act of rapidly reproducing it when the animal was accidentally killed. The legs and claws of lobsters will similarly grow again if torn off at their joints, though not if divided elsewhere. If certain worms be cut in two, each half will become a perfect animal, the head producing a new tail, and the tail a new head, and a worm of the genus *Nais* has been cut into as many as twenty-five parts with a like result. In higher animals, artificially separated parts often continue for a time to exhibit a certain vitality. A tadpole's tail cut off will for a short period continue its process of development. A lizard's tail will move rapidly after being separated. Frogs' amputated legs long continue to respond to stimuli. The heart taken out also continues for a time to beat, and after death different tissues continue for different extents of time to show signs of vitality. But the animal which is perhaps the most remarkable for its power of repairing injuries is the *Hydra*, almost any fragment of which will, under favourable circumstances, grow into a new and entire animal. This process, which excites our surprise and admiration in the case of animals, is so familiar

* See above, p. 170.

to us in plants that no one thinks the formation of fresh individuals by "cuttings" a matter of wonder, any more than the expansion of buds into shoots, branches, or even trees, like the banyan tree, capable of sheltering a regiment of soldiers.

But the buds of some plants become spontaneously detached from the organism—as in tiger-lilies—and such buds under favourable circumstances will grow and develop into plants like those which bore them, and some of the lower animals (*e.g.* the *Cœlentera*) also form outgrowths, or "buds," which similarly become detached and grow up into organisms like those from which they arose. Often these outgrowths spontaneously detach themselves from their source, as we see is the case in those plants that grow out into branches called "suckers," which take root and then separate, thus forming altogether new plants. The common bramble will attach itself to the ground by the end of a "shoot;" rootlets coming to take the place of the incipient leaves of the terminal bud of the shoot, and so give rise to a fresh stem.

Thus reproduction may clearly be but a certain mode of growth, as growth, of course, takes place by a reproduction of the component elements of the part which grows. "Growth" is "continuous reproduction," and "reproduction" is a form of growth which may thus be either "continuous" or "discontinuous." Continuous reproduction occurs in animals as well as plants, and thus it is that many coral animals grow up as arborescent structures or into large masses leading to the formation of reefs and islands. Discontinuous growth may occur in many worms (*e.g. Scyllis* and *Catenula*) which habitually divide themselves and so multiply. Also in those green flies, *Aphides*, so common on our pelargoniums and roses, a process of internal budding will give rise continually to new individuals, without any sexual process, as long as warmth and food are supplied. Many *Infusoria* * habitually multiply by self-made sections, that is, by spontaneous division or fission. But buds are frequently formed so simple in structure as to each consist of only a few, or even of a single cell, which buds, becoming

* See above, p. 320.

detached, can grow and develop by themselves into large structures or even into the parent form. Such are "spores" which are given off in such multitudes from ferns, fungi, algæ, etc. A *Gregarina* will contract itself into a sphere and then break up into a number of small bodies, each of which gives rise to another *Gregarina*. Indeed, so numerous and varied are such modes of reproduction, that we may well wonder that any sexual process should be ever necessary. There is a very curious reproductive process, termed "rejuvenescence," in various lowly organisms. In some Infusoria also two individuals will actually meet, blend together, and become one. In plants, we are familiar with the practice of "grafting," by which two plants also become one. Parts of one animal may likewise be implanted in the body of another, and there live and grow, becoming a part of its body. In the great majority of animals and plants, however, reproduction is frequently or invariably effected, not by mere discontinuous growth, or by some internal change in the contents of a single cell, but through the junction of certain distinct protoplasmic particles, from the union of which a new individual arises in a mode essentially similar to that already briefly described.*

Development.

The circuitous course pursued in the development of the human embryo has been previously indicated,† and a more or less similarly circuitous route is followed in the development of almost all animals. We have also noted how the course first taken by the great arteries in the human embryo resembles their permanent course in fishes, as also how the visceral clefts transitorily present in it, resemble the branchial openings permanently present in them. These are but two instances of a multitude of analogous facts; for the embryos of higher animals for the most part transitorily resemble, in their general features, the structure of other animals lower in the scale. The series of forms also through which the embryo of a higher animal passes in its development (or ontogeny), successively resembles, in a general way, a series of adult forms of other animals—a series increasing in complexity of structure, and in resemblance to the adult condition of such higher animal. Thus

* See above, p. 164. † See above, p. 171.

the heart of a man is at first a single tube, as it is permanently in Ascidians. His brain consists in its earliest stages of a series of simple vesicles, roughly like the brain of a lamprey. In a more advanced stage the human embryo is plainly the embryo of a mammal—being generally like the embryos of all other mammals. Later on the embryos of men and apes are exceedingly alike, but differ from the embryos of other mammals; and still later there can be no doubt but that the embryos of man and of anthropoid apes bear a very close resemblance to each other. Even at birth the infant's great toe is more widely separated from the others than in the adult man, and the body is clothed with a hairy coating, the lanugo, as before noticed.* These conditions exemplify a general law; for it may be said that the embryos of animals resemble each other the more and the longer, according as their adult conditions are the more alike. Before birth all mammals above marsupials, are nourished in the uterus by the blood of the mother through a structure termed a *placenta*, formed in essentially the same way, though in this respect the apes are the most like man. A placenta of a different type is found in marsupials, but not in any other vertebrates save certain sharks. After birth, all mammals are nourished like the human infant by milk. Such a provision is found in no other group of animals whatever.

Heredity. In our thirteenth chapter we have already called attention to the familiar fact of the hereditary resemblance which shows itself in successive human beings. This heredity is common to all organisms, which always resemble more or less closely the organisms which begot them. This is evidently a property not of the new individuals—the offspring—but of the parental forms. If any living creature was self-impregnating, and the outcome of a long line of self-impregnating predecessors, all existing in the midst of one uniform and continuously unvarying environment, then such a creature would evidently produce offspring completely like itself. The action of this law is modified by the diverse influences of parents and ancestors, as before pointed out in the case of man.† As a rule, modifications accidentally or

* See above, p. 173. † See above, *loc. cit.*

artificially induced in parents are not transmitted to their offspring, as is well shown by the need of the repetition of circumcision, and of pressure in Indian children's heads and Chinese girls' feet in each generation. Yet there is good evidence that such changes are occasionally inherited. Guinea pigs which have become epileptic through a certain mode of vivisection, have been known to have offspring with a marked epileptic tendency. A female cat, the tail of which had been injured, produced stump-tailed kittens in two litters,* and a bull which had lost its tail by an accident, has been said, by Professor Haeckel, of Jena, to have begotten tailless calves. Characters which depart from the normal type of a species or breed of animals, but which are congenital, are far more likely to be inherited than are those artificially induced. Such variations have already been noted with respect to man; † their occurrence in other animals, together with the circumstances which may be supposed to induce them, are matters the consideration of which must be relegated to the last chapter of the present section of this work.

Man and other organisms.

So far it is clear that, not only by his bodily structure, but also by the functions of his body, man is a true animal. All the vegetative functions—all the activities by which the life of each human body is maintained (the functions of outcome and income), and his species reproduced (the function of generation)—are essentially the same as those of other organisms, especially of other animals. It is particularly to one group of animals—the group of apes—that, by these bodily functions as well as by his bodily structure, he shows a markedly predominant resemblance. It remains to consider his relation to animals as regards their higher functions or faculties.

* See "The Cat" (John Murray), p. 7. † See above, p. 173.

CHAPTER XXIII.

THE ANIMAL FACULTIES.

The highest faculties of animals are different in kind from those of man. One distinct faculty (instinct) which is but very slightly developed in him is very highly developed in many animals.

Movement and feeling—Reflex action—Practical intelligence of animals—Animal language—Animal stupidity—Animal ethics and taste—Habit and instinct—Instinct a separate faculty—A reflex action of the individual.

Movement and feeling.

THE functions which are peculiar to the higher organisms and are exhibited by all living creatures which possess nervous and muscular tissue, are (as has been before said) those of movement and feeling. These two functions are distinguished as those of animal life, in contradistinction to the functions of nutrition and reproduction, which, being possessed by all plants as well as animals, are termed the vegetative functions. That the animals with which we are most familiar have feelings and emotions, and that we can, to a considerable extent, tell what they are, hardly any one will be disposed to deny. No reasonable man who sees a dog frisk about with wagging tail and cheerful bark, upon his master putting on his hat, can doubt but that the dog has also seen the hat put on, and is on that account excited by pleasurable, expectant feelings. Strictly speaking, of course, no one can directly and with exactness know any feelings but his own, though speech enables us to know that our fellow-men feel and have the same faculties and the same endowments, sensitive and intellectual, that we have. Animals cannot tell us in

words that they feel. Nevertheless, their mute expressions are amply sufficient to assure the common sense of mankind that many animals—*e.g.* a dog, a monkey, a parrot, or a frog—not only have feelings, but also, to a considerable extent, what those feelings are—certainly that they can see and hear.

But we have further grounds for believing that animals feel and possess sensitive faculties, similar to our own; for we have seen that function goes with structure, and we know by consciousness and observation that while our nervous system remains uninjured, diverse feelings attend the application of diverse stimuli to it. Now, seeing that birds, beasts, and other vertebrates have a nervous system more or less closely resembling our own, we may reasonably conclude that, as long as their organization is unimpaired, feelings more or less like ours will follow the application to them of stimuli like those applied to our own bodies. As to lower creatures, we find as we descend through the series of animals, an increasing divergence, in the form of their nervous system, and, on the whole, a decreasing complexity and perfection in its structure. Nevertheless, wherever we find eyes, we may conclude the creatures possessing them have some power of vision—if only a power of distinguishing between light and darkness—and wherever we find tactile organs, or appropriate movements (in uninjured organisms) in response to various forms of contact, we may conclude that there is also sensitivity. It is impossible to doubt, when watching a bee rifle a flower of its nectar, that the insect not only sees the flower but also feels those parts of it which it so dexterously explores. But we have already seen that, though other functions are ministered to by the nervous system * besides sensation, yet sensation is its especial function. We may therefore safely conclude, wherever we find any living animal which performs actions seeming to indicate the presence of sensation, and which has a nervous system intact and uninjured, that such an animal really feels. We say "intact and uninjured," because the phenomena of reflex action,† which we have already noted may take place in human beings

Reflex action.

* See above, p. 168. † See above, p. 167.

gravely injured, show that we might, without such reservation, fall into error. But, indeed, our judgment that similar stimuli produce in men and animals similar normal results, is confirmed by the fact that essentially similar abnormal results occur as a consequence of analogous injuries. In animals the nervous centres of which have been injured, reflex movements of the limbs will take place, similar to those which will take place in human beings in like case. Many animals, indeed, display reflex action in a much more surprising manner—notably the frog, which deserves to be called the animal-martyr of science, from the constant recourse which is had to it for physiological experimentation. Here it is evident that the stimulus is not the cause of the reflex action, but only serves to elicit it from an organism possessing a certain vitality and spontaneity. The real cause is immanent in the mutilated organism acted on. A frog which not only has had its nervous centres injured, but has had its head cut off, will yet make with its hind legs the most appropriate movements to remove an object applied to the hinder part of its body. If its skin be touched with some caustic fluid, a leg will be quickly advanced and applied to the irritated part, and if that leg be held, then the other leg will be moved and similarly applied. But this is not all: at the breeding season the male frog tightly grasps the female behind her arms, and, to enable him the more securely to maintain his hold, a warty prominence is then developed on the inner side of each of his hands. Now, if such a male frog be taken, and not only decapitated, but the whole hinder part of the body also removed, so that nothing remains but the fragment of the trunk from which the two arms with their nerves proceed, and if under these circumstances the warty prominences be touched, the two arms will immediately close together like a spring. Evidently, then, we can arrive at no trustworthy conclusions except by observations with respect to animals the organization of which is intact.

Practical intelligence of animals.

That animals have not only special senses and general sensitivity, but also much practical intelligence, is a fact which no sane mind can doubt. They show plainly enough

that they can thus appreciate (*i.e.* practically) very abstract matters, such as motion, number, cause, solidity, etc., and can attend to * and classify objects in various appropriate categories according to their several properties. As to motion, a cat which runs after a mouse, or even a pike which overtakes and catches a small fish, shows by its actions that it possesses a practical knowledge of what motion is; as does a dog which scuttles hastily out of the reach of a stone thrown after it. A dog may also show that it practically recognizes "number," when two friends simultaneously call it in two different directions.

Not merely such a very highly-organized animal, however, but even an insect will discriminate between objects which differ in number—between an attack by one enemy on one side of it, and a simultaneous attack by two enemies, one on either side of it; between one object of pursuit and several objects of pursuit—and will regulate its responsive movements accordingly. A dog, startled at the agitation by the wind of an expanded parasol lying near it on a grass-plot, may, by its angry growl, show its apprehension of some hidden, possibly hostile, cause of such motion; and it may show not only its appreciation of a cause, but of causes of different orders, when the raising of a latch may lead it first to display an excitement of expectation, to be followed by discriminating gestures, according as he who raises the latch may prove to be the dog's master, a known visitor, or a suspicious-looking stranger.

An elephant will hesitate to cross a bridge it seems to feel insecure, thus showing in one way that it has a distinct and practical apprehension of the abstract quality, "solidity," as a hyæna making an extra effort to crush a very hard bone, shows it in another way. Animals, again, readily vary their conduct according to the properties of objects presented to their senses, *i.e.* they recognize, draw practical inferences,† and, as before said, *classify*. A cat will make use of visible characters as a basis of its system of classification. A dog divides the material universe, organic and inorganic, into groups and sub-groups according to a finely graduated series of smells.

* See above, pp. 95, 191, 192. † See above, pp. 94, 194, 195.

Animals of the most varied kinds, from insects to apes, will, as their actions prove, anticipate, from signs which they recognize, the presence in objects of characters and tendencies to action as yet unperceived. A monkey will show a practical dread of the hurtful properties of a viper, and a wasp, a similar appreciation of the luscious sweetness hidden beneath the skin of the ripe fruit it attacks. Insects, indeed, present us with wonderful phenomena of an intelligent nature. Ants display a complete and complex political organization, classes of beings socially distinct, war resulting in the capture of slaves, and the appropriation and maintenance of domestic animals (*Aphides*) analogous to our milk-giving cattle. Moreover, animals practically apprehend universals,* for a sheep does not dread a particular wolf, but any wolf—"wolf in general."

Can we, then, attribute to animals an intelligence such as our own, but inferior in amount—alike in kind, and differing only in degree? Before seeking a reply to this question, it may be well for the reader to carefully reperuse the fourteenth chapter of this work,† in order to realize how rich are the sensitive faculties, and how numerous and complex are the practical cognitions possible even in man, without the exercise of intellect. All those varied sensitive powers, with the corresponding bodily activities, are unquestionably possessed by the higher animals as well as by man; and if those animals do not possess the higher faculty of intellect, then it may well be that, such sensitive faculties (having the whole field of life, as it were, to themselves), may energize more vividly and perfectly in animals than they can do in us where they are so commonly interfered with by the action of the intellect. But some readers may be inclined to impatiently protest that animals are without question highly intelligent, that many of them know their homes, their friends, and their enemies; that, therefore, animals "know" ‡ many things which we know, and that though they have not the use of words, they must, at least, have "ideas," and therefore a true intelligence. Now, most certainly animals have "intelligence," "understanding," and

* See above, p. 206. † See above, p. 178.
‡ As to the various meanings of the word "know," see above, p. 189.

"knowledge," in the loose sense in which those terms are popularly used. We should be very sorry to deny the admirable and lovable endowments of the animal world. A man must have a very defective nature who does not love his faithful brute companions. But we ought not to allow affection, any more than hatred, to blind us and so mislead our judgment, and, in considering the higher faculties of such creatures as dogs and monkeys, there are four rules which should be borne carefully in mind. These are :—

1. To guard against the misleading tendency of our emotions. The owners of pet animals are frequently tempted to read in their actions meanings for which there is no real evidence, and to mistake imperfect inferences, due to partiality, for real observations.

2. To guard against our besetting tendency to judge everything by our own standard, and without reason to imagine the existence of human qualities in beings which are not human. This is the error of *anthropomorphism.*

3. Not to suppose that unknown causes are acting, when known causes suffice to explain all the phenomena observed. This is the old, well-known rule, called Occam's Razor : "*Entia non sunt multiplicanda præter necessitatem.*"

4. To bear in mind that if any cause, did it exist, would produce certain effects, we must not suppose the existence of that cause when such effects are not to be discovered.

Now, we do not hesitate to affirm that there is no known action of any brute animal which cannot be fully explained by its possession of those merely sensitive faculties which have been enumerated under the head of "our lower mental powers,"* and the exercise of those co-ordinate actions directed to avoid pain and follow up pleasure, which we ourselves also possess, and which we know may act without the co-operation of rational intelligence, because they may so operate in our own case. For such action, it is necessary, indeed, that the animal should sensibly cognize external things, but it is not necessary that it should intellectually perceive their being ; that it should feel itself existing, but not recognize its existence ; that it should

* See above, pp. 200, 201.

feel relations between objects, but not that it should apprehend them as relations; that it should have reminiscence, but not recollection; that it should feel and express emotions, but not itself advert to them; that it should seek the pleasurable, but not make the pleasurable its deliberate aim. True, or intellectual, intelligence, therefore, is not (according to the third of the above rules) to be asserted of animals, because their actions can be explained without it, by the help of that sensitivity which the combined study of anatomy and physiology shows us they do possess, and which we also possess. Thus, the so-called "universals" of animals are not true universals, or intellectual ideas, but answer only to our own sensuous, generalized cognitions.* But our fourth rule absolutely compels us to deny real intelligence to brutes. For if they had capacities similar to our higher mental powers, they would very soon make us unmistakably aware that such was the case. If animals could inform one another of facts they had observed, and then act together truly in concert, very unpleasant phenomena would soon make it impossible for us to deny them true intelligence. A careful consideration, on the other hand, of what the processes of mental abstraction and judgment really are,† will, we think, make it impossible for him who so considers those faculties, to attribute them to brutes even of the highest order of mammals. The movements and gesticulations of apes have a misleading appearance, simply due to the fact that they can only move their limbs and features according to the laws of their construction; and these are very like our own. Moreover, not only does the form of their body and limbs induce a resemblance of the kind, but the probable resemblance which also exists between the minute structure of their nervous centres and our own, renders it likely that they exceptionally resemble us, not alone in their motions, but in their feelings and in some of their emotions also. Such resemblances, however, do not imply a resemblance as to intellect.

The besetting tendency of many persons to exaggerate the higher faculties of animals (their pets) has just been

* See above, p. 191. † See above, from p. 211, to p. 215.

referred to, but a still stronger tendency to such exaggeration besets many modern writers on account of a philosophical prejudice. Because they do not see how man can have come to have a faculty different in kind from that of animals, they strain every point—exaggerate some facts and ignore others—to show that he has no such different faculty. But in science the first question is not how anything exists or becomes, but whether it does exist or not, as a fact. Mr. Chambers, Professor Bain, and the late Mr. G. H. Lewes agree as to this tendency to exaggeration, declaring it to be "nearly as impossible to acquire a knowledge of animals from anecdotes, as it would be to obtain a knowledge of human nature from the narratives of parental fondness and friendly partiality," and affirming that the researches of various eminent writers on animal intelligence have been "biassed * by a secret desire to establish the identity of animal and human nature." All the actions of the most intelligent animal can be understood as results of powers like our lower mental faculties, without deliberation or consciousness. For such action it is necessary, indeed, that the animal should (as before said) sensibly cognize things, but not that it should intellectually perceive their being; that it should feel itself as existing, but not recognize its existence; that it should feel relations between objects, but not that it should apprehend them; that it should remember, but not seek to recollect, or know that what it remembers is passed; that it should feel and express emotions, but not recognize them; that it should seek what pleases it, but not that it should aim at pleasure, or know that the pleasure which it feels is pleasurable. By the exercise of such merely sensitive faculties brutes can pursue an escaping prey, jump up

* To show the justice of such observations, two quotations may be given. The first is from Dr. Bastian's work, "The Brain as an Organ of Mind," where, at p. 328, we read the following citation: "When Dr. Hermes left the gorilla, on the previous Sunday, the latter showed the doctor his tongue, clasped his hands, and squeezed the hand of the doctor as an indication, the latter believed, of his recovery." In the recently translated work of Professor Büchner, entitled "Mind in Animals," we are gravely told (p. 249) of two bees performing a sort of funeral ceremony. They are represented as flying out of the hive, "carrying between them the corpse of a dead comrade," and then, having found a suitable hole, they "carefully pushed in the dead body, head foremost, and placed above it two small stones (!). They then watched for about a minute before they flew away.'

banks or rocks, or climb to attain what is otherwise out of reach, prepare stakes for a dam as does the beaver, or employ a stone to crack a hard nut as does the common American ape, the sapajou. Actions such as these are performed to complete a harmony * which the imagination craves, owing to associations, previously effected, between groups of feelings and emotions, and groups of groups of such. A cat does not need to entertain any intellectual knowledge or belief that the sound of clattering plates means possible food, to obtain which it must make certain movements. Quite independently of such belief, and by virtue of mere sensuous association, the sound of the plates is alone enough to give rise to such movements on the part of the cat as have previously become associated with pleasant sensations of taste. Let certain sensations, emotions, and movements become associated, and then the former need not be noted; they only need to exist for the association formed to produce its effects. When the circumstances of any present case differ from those of some previous experiences, but imperfectly resemble those of many past experiences, parts of these and consequent actions are irregularly suggested by the laws of resemblance, until some action is hit on which relieves pain or gives pleasure. For instance, let a dog be lost by its mistress in a field in which he has never been before. The presence of the group of sensations which we know to indicate his mistress is associated with pleasure and its absence with pain. By past experience an association has been formed between this feeling of pain and such movements of the head as tend to recover some part of that group, its recovery being again associated with movements which, *de facto*, diminish the distance between the dog and his mistress. The dog, therefore, pricks up his ears, raises his head, and looks round. His mistress is nowhere to be seen; but at the corner of the field there is visible a gate at the end of a lane which resembles a lane in which she has been used to walk. An image of that other lane, and of his mistress walking there, presents itself to the imagination of the dog; he runs to the present lane,

* See above, p. 200.

but on getting into it she is not there. From the lane, however, he can see a tree at the other side of which she was wont to sit; the same process is repeated, but she is not to be found. Having arrived at the tree, he thence finds his way home. By the action of such feelings, imaginations, and associations, which we know, by what takes place in man, do exist, and are true causes, all the apparently intelligent actions of animals may be explained without the need of calling in the help of a power (intellect), the existence of which in animals is inconsistent with the phenomena they, as a whole, exhibit. The exercise of the highest faculties in animals may perhaps be best compared with dreaming in man. The comparison is, however, necessarily inexact, because our intellect, acting in an involuntary manner, so modifies our dreams that they always must be different from any state of a being which has no intellect at all. Nevertheless, our dreaming condition may serve as an approximative, though inexact, representation of the highest activity which exists in the highest animals.

Animal language.

There is one plain and obvious difference by which all kinds of animals differ from all races of men. Men speak, but animals are dumb. Some readers, however, may be inclined to reply that there are such things as dumb men, and that many animals are eloquent with a language of their own. The songs and calls of birds have meanings which are practically understood by their fellows. Some dogs will make certain facts—the presence of a rabbit or a thief—known to their masters, and also indicate which of the two it is by the kind of sound they make. Pointers and setters, by their gestures, will make known other facts, while parrots and jackdaws can learn actually to speak whole sentences. All this is very true, but it is nothing to the point. We have in our sixteenth chapter * abundantly (we believe) shown the difference between emotional and intellectual language. We have also there pointed out how mutes have a truly intellectual language of gesture, and that a mere inability to utter sounds through some structural defect, no more proves a man not to be an essen-

* See above, p. 224.

tially "speaking animal," than does the fact that another individual cannot speak because he is gagged. No reasonable man can deny the expressiveness of brute language, but it is nevertheless fundamentally different in kind from human language. Following up an illustration before given,* let us suppose that a brute and a man are standing under an oak-tree which begins to fall. The falling tree will produce similar effects upon the senses of both man and brute. Both will instinctively fly from the danger. Both may cry out from alarm, and both, by their cries and gestures, may give rise to similar feelings of alarm in other men and brutes. In so doing both give expression to the lower kind of language—the language of emotion. It is true that some brutes can articulate, and it is quite conceivable that brutes might (though, as a fact, they do not) so associate certain sensations and gratifications with certain articulate sounds, as, in a certain sense, to speak. That is to say, it is conceivable that a parrot might learn to utter certain words which he has come to associate with some gratification, just as a dog who "begs" has associated that gesture with the imagination, "sugar to follow.' This, however, would in no way even tend to bridge over the chasm which exists between intellectual speech and the language of emotion. Similarly, if a dog could be trained (as a pig has been trained) to select, from a number of cards with letters on them, cards with the letters C, A, K, E, which act he has associated with "eating cake," it would be no argument that the dog had a comprehension of the word thus spelt.† In order to comprehend that, he must possess that lofty power of abstraction before described, and which every savage possesses who says, "My spear is broken," or, "I am hurt." All tribes of men possess this power,‡ but no animal presents us with an indication that he shares it with us. Did he share it—had he the *verbum*

* See above, p. 225.

† Thus, were an animal to be discovered more man-like in form than the gorilla, and did it, after being trained, advance towards us saying, "Please give me cake," at the same time presenting us with cards on which those words were written, such actions would not form the slightest argument in favour of its rationality, did it in other respects show no more power of forming abstract ideas than other animals do.

‡ See above, chap. xix., p. 279.

*mentale**—he would at once tell us so in language; † not necessarily with the language of the tongue, but that of gesture.

To convince us that they possess this power, they need merely use an intellectual gesture language, like that employed by the deaf and dumb in reciting the Lord's Prayer,‡ or like that which is used in ballets. Could they do that, it would be enough to show us that animals are rational—that they really possess abstract ideas. The absence of any such manifestation, in spite of the many needs and the many exciting causes likely to elicit its display, eloquently proclaims their essentially unintellectual condition. Animals have all the *bodily* powers needed for expressing ideas by gestures, but they do not do it. Their senses are keen enough to give them ideas about things felt, but they have them not; evidently because a higher faculty is wanting. A dog's world is, as before said, a world of smells; but he has no idea of a smell, as such, or of the difference between a smell and a sight.

Animals are astonished, but they have no recollection of being astonished, or knowledge that they are astonished. They recognize objects both natural and artificial, but they have no idea of the artificial, for they have no true ideas whatever. A dog may fear another dog which is stronger and fiercer, but it will have no idea of courage and fierceness. Many animals, even insects, will distinguish clearly

* See above, p. 235.

† That acute, well-informed writer, Mr. G. H. Lewes, has said on this subject that animals "communicate only feelings . . . they cannot communicate knowledge of objects, having no ideas of objects. . . . When a dog is shut in a room and wants to get out, he whines and scratches at the door; these are reflex expressions of his feelings, and having learnt that whining is often followed by the door opening, he expects that if he whines the door will open. It is the same when he desires food. This rudimentary stage of the use of vocal sounds as signs of communication between him and his master remains, however, so rudimentary that he never generalizes it beyond his actual experiences—he does not whine to his fellows, nor does he whine to escape punishment, etc. And the communication is never other than that of desire. Objects, except as motives, do not exist for him. He has no power of abstraction capable of constructing ideas of objects; he has only sensations and imaginations representing sensibles. But ideas expressed in words are not sensible objects; they are mental constructions, in which relations abstracted from things are woven afresh into a web of sensibles and extra-sensibles, and concrete particulars become concrete generals" ("Problems of Life and Mind," p. 159).

‡ See above, p. 228.

between differently coloured objects—the white from the blue, the red from the yellow; but no animal knows "whiteness" or "blueness," and still less does it know the higher abstraction "colour." Yet every savage who rewards a youth of his tribe for an act of courage, or who ornaments his body with pigment, shows thereby that these abstract ideas are familiar to him. As we have seen, animals practically classify, but no animal knows "kinds," or "classes," or "properties," or "qualities," *as such*, though these abstractions are conceived of by men who are deprived of the gift of oral utterance.* Thus, the so-called "intelligence, understanding, and knowledge" of animals are not really true intelligence, understanding, and knowledge. They are the sensuous simulation of such intellectual faculties. That the distinction is not a mere question of the presence or absence of words, we have already shown:† it consists in the presence or absence of abstract ideas. Animals are incapable of making signs or emitting sounds (articulate or inarticulate) which answer to such ideas, though they may eloquently express their feelings and emotions by cries and gestures, and can sometimes distinctly articulate words.‡

Since animals have not abstract ideas, they cannot have the highly abstract idea "I," which can only be obtained by a reflex act.§ But animals do not reflect; so they cannot be conscious. Yet no animal mistakes himself for another, and doubtless the higher animals have a sense of the continuity of their existence, like our mere feelings of self and not-self.‖ Though they have not consciousness, they possess consentience,¶ and we cannot doubt (for there is no structural or functional evidence to induce us to doubt) that in them, as in us, sensitive influences of different kinds are received in one common sensorium. Considerations like those before brought forward with respect to human idiots and sleep-walkers** apply to animals also. A tiger not only hears the plaintive cries of its victim, but at the same time can see and feel its writhing limbs, and taste and smell its blood. Such sensations also, no doubt, call up

* See above, p. 229.
† See above, p. 233.
‡ See above, p. 235.
§ See above, pp. 20, 21.
‖ See above, pp. 189, 190.
¶ See above, p. 183.
** See above, p. 199.

within it more or less distinct reminiscences of similar feelings previously experienced, and give rise to vivid emotions and to appropriate actions. With this basis of consentience and with the aid of sensuous memory, animals can associate groups and groups of feelings and emotions, and so come to have those sensuous cognitions and feelings related to succession, extension, number, motion, etc., which have been enumerated, in the fourteenth chapter, amongst our own lower mental powers. These, with the phenomena of habit and instinct which have yet to be considered, are, we believe, amply sufficient to account for all the apparently rational acts of animals, without attributing to them that higher kind of faculty which we distinguish as true or "formal" intelligence in ourselves.

Animal stupidity.

Indeed, if all or nearly all the facts easily observed with respect to the actions of animals were taken into account, we should have to say that if they possess our intellectual faculty, they are often wonderfully deficient in the exercise of it. Many persons eagerly note and are prone to exaggerate any action of animals which show, as they think, true intelligence, but, as a rule, they fail altogether to observe phenomena which bespeak a want of intelligence. On this account a book requires to be written on "the stupidity of animals." Acts which would be reckoned as signs of extreme obtuseness and stupidity in us, are common enough amongst animals usually reckoned as the most intelligent. Dogs are generally praised, and very justly so, for their fidelity and for the energy with which they will often seek to defend their master against an enemy, real or supposed. But, in a sudden scuffle, it is by no means an unprecedented thing for a dog to fly at his own master. What dog that has seen fuel put upon fires again and again, ever puts on any himself to maintain the heat he so greatly enjoys? Apes have been said to warm themselves at deserted fires, yet no one asserts that they have made them up. It is wonderful if they do not, for such an act seems to come well within the scope of our lower, non-intellectual faculties. Some readers may have had a pet cat which has now and again got a fish-bone or chicken-bone fixed between its back-teeth. The useless motions the animal, when so cir-

cumstanced, will make with its paw are sufficiently irrational; but although the action may have occurred to it several times, it will act in the same way again and again, and will sometimes stupidly struggle against its master while he removes the object which distresses it; and, as soon as it is removed, the animal will go off licking its jaws, without a sign of gratitude for the relief afforded. Swallows will continue to build on a house which they can see is being demolished. The higher faculties of bees have been (as Sir John Lubbock has shown) absurdly misrepresented; and flies will deposit their eggs on a carrion plant instead of on animal matter, which is absolutely needful for their young. But even the animal often reputed the wisest, the elephant, not long ago, in our Zoological Gardens, gave proof of extreme stupidity by actually pulling off the terminal portion of its own trunk (which had got caught in a cord) instead of calling for help and waiting till its keeper came. It would be an easy task to multiply instances of actions in animals which must be called stupid if they have the use of an intellect similar in kind to our own. In fact, however, they merit no such reproach, but, as a rule, make an excellent use of the admirable but non-intellectual faculties with which they are actually endowed The mistakes which have arisen in this matter are very often due not so much to an exaggeration of animal intelligence as to a want of appreciation of the intelligence of man—especially to ignorance of what is meant by abstraction, and of the absolute need of a high degree of it for all our intellectual acts, including those of gesture, language, and of speech.

Animal ethics and taste.

One of the strangest misapprehensions connected with this subject is that which has led some persons to attribute to animals the possession of a rudimentary morality. We have seen in our seventeenth chapter * what is the real nature of morality, and how its exercise depends on the possession of the highly abstract idea, goodness. Mere feelings of sympathy, companionship, regretful feelings, and feelings of shame, are phenomena of our lower or merely sensuous faculties,† and doubtless exist in some of

* See above, p. 243. † See above, p. 186.

the higher animals to a greater or less extent. It may be, as has been suggested, that a swallow which has migrated, and left a young brood behind to starve, will feel agony at the reminiscence of its neglected offspring; but such agony would not be ethical unless she looked back and judged that she *ought* not to have left them. Moral actions, to be moral, must spring from present or habitual judgments of a special kind.* Animals will sometimes perform actions beneficial to other animals, and this may be even due to kindly sympathy. Such actions would, of course, be "good" actions, in a certain sense; they would be materially good; but to be really ethical, they must possess formal goodness †—they must be due to a perception of what is right. In the same way animals can have no true perceptions of either truth or beauty. But this in no way prevents their having those feelings of "smooth and easy transition" which accompany our perceptions of agreement and truth,‡ or pleasurable feelings, to a certain degree like those which we have on contemplating anything we find beautiful and the beauty of which delights us. It is very probable that some animals take a keen pleasure in seeing bright-coloured objects, as may be inferred from the actions of the bower-bird alone, which collects such objects and places them at the entrance of its bower; and doubtless the aspect of the brilliant plumage of one bird may strongly excite the feelings of another: but this is a very different thing from a perception of the beautiful. It is not to such a perception that the Chulos trust when with their cloaks they attract a bull from a fallen horseman during a bull-fight. Thus the higher animals may share in many human emotions, as well as in our sensations and desires. Affection, the feeling of fidelity, fear, anger, shame, pleasurable anticipations and painful reminiscences, exist in them as well as in us, but they cannot and do not reflect upon their feelings, or know that they possess them. It is on this account that the sufferings of animals are so immeasurably less than are our own. No ideal reproduction of the past projected into an ideal future,

* See above, p. 252. † As to this distinction, see above, p. 249.
‡ See above, p. 194.

adds to their torment as it does to ours. Animals suffer, and may suffer keenly, but happily they do not know they suffer, and in the absence of consciousness, the pangs of mere consentience may, for all we know, be as nothing compared with any real pain known to man.*

Habit and instinct.

One interesting and important characteristic of animals is their power of forming habits—a power somewhat similar to that which occasions in us those involuntary but felt actions (sensori-motor actions) to which attention has been already called,† as being analogous to reflex action. The nature of habit, as it exists in man, has been already pointed out,‡ and it is in other animals, as it is in him, "the sign of a special internal spontaneity, whereby they both tend to act and to react when acted on." All that has been said of habit as it exists in ourselves, applies likewise to other animals.

Instinct has also been noticed as it exists in man,§ and all that has been said of it as it exists in him may also be affirmed of it as it exists in animals. In them, however, it is much more conspicuous than in human beings. Thus birds plainly show their instinctive powers. Chickens, two minutes after they have left the egg, will follow with their eyes the movements of crawling insects and peck at them, judging distance and direction with almost infallible accuracy. They will instinctively appreciate sounds, readily running towards a hen hidden in a box when they hear her "call." Some young birds, also, have an innate, instinctive horror of the sight of a hawk and of the sound of its voice. A young turkey which Mr. Spalding had taken under his care, was, on the tenth morning of its life, eating its breakfast from his hand, when a young hawk in an adjacent cupboard uttered its shrill cry. "Like an arrow the poor turkey shot to the other end of the room, and stood there motionless with fear, until the hawk gave a second cry, when it darted out at the open door to the extreme end of the passage, where it crouched down in a corner." Swallows, titmice, tomtits, and wrens, after having been confined from birth, were found by Mr. Spalding to

* As to this, see further, chap. xxvi., "The Evils of Life."

† See above, p. 168. ‡ See above, p. 174. § See above, pp. 175, 184.

be capable of flying successfully at once when liberated, on their wings having attained the growth necessary to render flight possible.

Birds will feign lameness or some other injury to draw off attention from their eggs or young. The Duke of Argyll has related* some very interesting particulars about the instincts of birds, especially of the water-ousel, the merganser, and the wild duck. Birds of the first year migrate readily to avoid a cold of which they can have no knowledge. Beasts also display instinct. Some young puppies, M. Gratiolet tells us, which had never seen a wolf, were thrown into convulsions by the smell of a small portion of wolf-skin. But it is insects which display instinct the most remarkably. Indeed, their faculty in this respect is so wonderful, and notorious, that it will probably suffice to refer to one or two examples of it. The female carpenter-bee, in order to protect her eggs, excavates in some piece of wood a series of chambers, one above another, separated by partitions, the lowest chamber communicating with the exterior. She lays an egg in each chamber, beginning with the lowest. From that lowest the offspring escapes by the passage left for it. The inhabitant of the chamber next above gnaws through the floor of its dwelling, and makes its way out by the same path as did its predecessor. The inhabitants of the superior chambers then act similarly in succession. Evidently this complex nest has been constructed with a view to the future actions of the progeny, but just as evidently the young mother could have no knowledge of the series of actions which were to ensue after she had made it. Again, the female of the wasp (*Sphex*) will hunt about till she finds some suitable caterpillar, grasshopper, or spider, which she adroitly stings at the spot which induces, or in the several spots which induce, complete paralysis, so as to deprive it of all power of motion without killing it. This done, she stows away the helpless victim along with her eggs, and she does this because, when her eggs are hatched, the grubs which issue from them will require living, animal food, while they will be utterly unable to catch, retain, or prey upon any active,

* In his "Unity of Nature," chap. iii.

struggling insect. The species of sphex which preys on the grasshopper, first stings it and then throws it on its back, so as to get at the delicate membrane which unites the pieces of its hard armour at their joints. This it bites through, and a special nervous ganglion (there concealed) is reached and mutilated, and so the end to be attained is effected. A certain resemblance to this habit has been noticed even in beasts. In a polecat's nest, where five young were comfortably embedded in dry grass, there were found * forty frogs and two toads stowed away in a side hole serving as a sort of larder. All these frogs and toads were alive, yet only capable of sprawling a little. On examination, the whole number proved to have been dexterously bitten through the brain, and thus the young polecats had food which would keep quite fresh, because alive, and yet would be as safe from running away as if it was dead food. There is a kind of wasp which feeds her young from time to time with fresh food, visiting her nest for that purpose at suitable intervals. She covers her nest so carefully with sand that human eyes cannot distinguish it, and this covering she removes and carefully replaces at each visit. While it remains thus hidden, she is always able herself easily to find her carefully concealed nest; but if the way into it be opened and made ready for her entrance, this, instead of helping her to get at her young, altogether puzzles her—she becomes quite at a loss, and does not even seem to recognize her offspring. As every one knows, moths and butterflies habitually lay their eggs on the leaves of such plants as will nourish their young, although the parents do not feed upon or make any other use of them. It may even be that the parents do not feed at all, and it would be a strong thing to say that they recollect what they did before they entered into the chrysalis condition, and that they consciously foresee that their eggs will give birth to creatures such as they themselves once were. Still more incredible is it, however, that a grub should foresee the shape of that body into which it is destined to be transformed, especially when this is widely different in the two sexes. Yet the grub of the

* See *Magazine of Natural History*, vol. vi., p. 206.

female stag-beetle, when she digs the hole wherein she will undergo her metamorphosis, digs it no bigger than her own body; whereas the grub of the male stag-beetle makes a hole twice as large as his own body, in order to leave room for the enormous jaws (the so-called "horns") which he will have to grow.

The larva of the emperor-moth, when about to become a chrysalis, spins for itself a double cocoon, but leaves an opening fortified with elastic bristles which point outwards, so arranged that while they readily yield to pressure from within (allowing the moth easily to make its way out), the bristles firmly resist pressure from without. But most wonderful, perhaps, of all are the instincts of social insects, such as bees, where there are not only males and females, but a large population of practically neuter insects, the special instincts and peculiarities of which have, of course, been transmitted to them, not by another neuter insect but by a female, the instincts and peculiarities of which are very different from those of the neutral portion of her progeny. Some insects also when in danger become perfectly quiescent, and so escape observation—an action often spoken of as "shamming death."

Instinct a separate faculty.

Montaigne sought to explain instinct as but a form of intelligence; but it must be something distinct from intelligence, even such as by analogy may be said to exist in animals. This is shown by the actions of the birds above mentioned, which have just left the egg; and it would be but waste of time to argue against the view that the human infant is guided by intelligent purpose and conscious foresight in its very first acts of sucking, swallowing,* and defecation. It is impossible also to suppose that any form of knowledge guides the actions just described of the grubs of the emperor-moth and stag-beetle. Intelligence, therefore, is a radically insufficient explanation, as also, for the very same reasons, is Condillac's hypothesis, that instinct is the result of an animal's individual experience. It is manifest that experience could not lead a creature to perform acts with reference to conditions quite different from all those it had as yet had any experience of. Yet such

* See above, p. 175.

are the acts of the insects referred to, and the human infant has had no experience whatever. Lamarck considered instinct to be "habit which had become hereditary." This hypothesis is one much more worthy of careful consideration than the two others just considered. For it may be admitted at once that habits are sometimes inherited. There are many instances of such inheritance in human beings. As regards animals, the barking of dogs may be taken as an instance of a habit thus perpetuated. In fact, "habit," when inherited, so simulates instinct, that their confusion is far from surprising. There is, however, this radical difference between them: "habit" enables an agent to repeat with facility and precision an act which has been done before, but "instinct" determines with precision the first performance of the act. To try to explain instinct by habit is but putting the difficulty with respect to instinct (if there is one) a step back. It is impossible to believe that any of the progenitors of an infant of to-day first acquired, during his or her lifetime, the habit of sucking, or that the habits of neuter insects (*e.g.* working bees) thus arose. But after all, if we *could* explain "instinct" by "habit," should we thereby make the phenomena less mysterious? "Habit" is due to an internal spontaneity of living things. A living thing, no doubt, requires some definite impulse in order that it should move, but when it does move that movement is its own. All living organisms tend to act. With them, as with us, there is a natural yearning for action, and, within limits, their powers and energies increase with action, and diminish and finally perish through repose. The power of generating any "habit" lies in the very first act of the kind an organism performs,* and it is only the first act which owes nothing to habit. If such were not the case, an act—as before said—might be performed a thousand times and yet not generate a habit. Moreover, the attempt to explain "instinct" through "inheritance" is a contradiction, since "inheritance" supposes something already obtained, otherwise it could not be transmitted.

But another attempt has been made to deny the exist-

* As in man, see above, p. 174.

ence of instinct as a distinct faculty, by explaining it as a result of past intelligence. According to this hypothesis such actions as are called instinctive, and which are performed automatically, are actions which were originally performed intelligently and of set purpose—just as people may come to play a tune without attention or consciousness which nothing but laborious, conscious attention could ever have enabled them to learn. This view assumes that a conscious, deliberate, discriminating faculty must have once been exercised by wasps, bees, and ants, and other much lower animals, in the performance of all those actions of theirs which are now classed as instinctive. Here the same objections, arguments, and considerations apply, which were before urged against Montaigne's supposition that instinct is but a form of intelligence. We may again ask, Could an adult female insect be supposed to foresee the future needs of her first progeny, often so totally different from her own wants; or recollect her past experiences, as a chrysalis and as a grub, from the moment she first quitted the egg? Still more absurd would be the belief that the grub of a male stag-beetle ever deliberately reasoned out the need of making his chrysalis-bed twice his own size on account of jaws he is destined to grow, but which he not only has not, but has never seen in adult individuals of his own species. The same consideration applies to the cocoon of the emperor-moth, and to an immense number of similar facts, including the actions of the human infant. Nevertheless, though the idea of "lapsed intelligence" will not explain "instinct" generally, we should be the last to deny that certain apparently instinctive actions may be so explained, and we fully admit that intelligent action in ourselves does tend to become practically instinctive. It is, moreover, very fortunate for us that such is the case, as thereby we are saved great mental friction. Our intellect has first to be laboriously applied to learn what afterwards becomes almost automatic —as is the case with reading and writing. Sensations and bodily actions having been duly kneaded together, the intellect becomes free to withdraw and apply itself to other work, leaving the organism to carry on automatically, and with little effort, the new powers thus acquired by a great

effort.* Were it not for this power which we have of withdrawing our attention, our intellect would be absorbed and wasted on the merest routine work, instead of being set free to appropriate and render practically instinctive, a continually wider and more important range of deliberate, purposive actions.

A reflex action of the individual.

Attempts have also been made to explain "instinct" as a form of "reflex action," or rather of that automatic response to felt stimuli called "*sensori-motor* action." † In a certain very wide sense of these terms that explanation may pass, but such is not the sense in which the term "reflex action," or "*sensori-motor* action," has (so far as we know) hitherto been used. The attempt to explain instinct by such actions, in the ordinary sense of those terms, is an attempt to explain a phenomenon by omitting its most striking characteristic. In reflex action and *sensori-motor* action, we have a sudden response to an unfelt or a felt stimulus, which response is more or less appropriate at the time of its occurrence, but has certainly no reference whatever to future events which are to occur long after the faintest waves of the stimulating action have died out. The very essence of instinct, however, is to provide for a more or less distant future, often, as we have seen, the future of another generation. It is essentially telic (*i.e.* is directed to a definite end), and refers to circumstances future and unforeseen, at the time the instinctive action takes place. This explanation, then, is fundamentally and necessarily inadequate. It is like an explanation of the building of a house by "bricks, mortar, bricklayers, and hodmen," with the omission of all reference to any influence governing their motions, and directing them towards a common and predetermined end which is not theirs. But though we cannot explain "instinct" by these automatic responses to unfelt or felt stimuli, there is none the less a certain obvious affinity between them and instinct. In fact, all animal action is "reflex," in the widest sense of that term; for all such actions result, and are a reaction, from stimuli (internal or external) which are either felt or not felt. The effects of stimuli, moreover, differ according to what it is they stimulate. The ultimate

* See above, p. 185. † See above, p. 168.

protoplasmic particles of the innermost parenchyma of the body of man, and the naked isolated particles of protoplasm which compose the minutest and lowest organisms, react upon the stimulus of a certain degree of heat, of moisture, or chemical action. The various different tissues of which the bodies of organisms are composed severally react, upon stimulation, in different ways, the study of which constitutes the science of the physiology of the tissues. The organs and systems of organs of the body have also their various modes of definite reaction, the consideration of which constitutes physiology as ordinarily understood. But this is not all. The entire body of a living creature reacts as one whole, in response to influences brought to bear upon it. This we see in the hibernation, or winter sleep, of bats and hedgehogs; in the effects of violent emotions of fear and anger, and in the results of sexual and reproductive influences upon the whole organism. The activities and reactions of the whole body of an animal—including the process of its individual development—form a separate department of the study of function, and may be called "the *physiology of the individual*." *

Now, inasmuch as function and structure vary together, and as the various actions of the organs of animals depend upon the various properties of the parts which act; so also the activities of each animal as a whole, its habits and instincts, are closely related to its structure. Were it possible for us to artificially construct an animal completely and then animate it, no doubt we should find we had endowed it with all the instincts pertaining to that particular kind of structure. They may, therefore, be said to be the sensori-motor actions of each animal as a whole, and may thus be explained as a form of reflex action in the highest and widest sense of that term. But the sense in which that term is used must be a very wide one, for instincts are not absolutely invariable. They are modifiable to a certain extent by circumstances, and by the powers of sensuous cognition an animal may possess. The absence of accustomed objects of sense, with the presence of others in their place, will (under the stimulus of hunger, or the felt

* Or part of its *pyschology*, in the proper sense of that term (see below, chap. xxv., "Psychology and Physiology").

needs of the reproductive processes) lead birds in abnormal conditions to build their nests in unwonted ways. Similar abnormal influences will lead many creatures to seek their food (whether on land, in water, in the branches of trees, or beneath the surface of the earth) in modes other than those which up to that time have been adopted by creatures of their kind. Nevertheless, if we may call instinct "the reflex activity of a whole living organism," that function remains one clearly distinct from all the other forms of vital activity which we have yet considered. Something, however, yet remains to be said about "instinct," considered as an outcome of the struggle for life which all organisms have to undergo. But that question cannot here be entered upon, because it must be preceded by some considerations concerning the relations which living creatures bear to their environment—their external relations — considerations to which the next chapter will be devoted. The question must be relegated to the twenty-seventh, and last, chapter, which will treat of "evolution."

CHAPTER XXIV.

THE EXTERNAL RELATIONS OF ORGANISMS.

Groups of organisms differ greatly as to their relations to past time and their geographical distribution, while the life of individual organisms depends to a large extent upon other organisms living at the same time ; and not only are individual organisms affected by their environment, but such affections may be inherited.

Relations to time and space—Inter-relations of organisms—Effects produced on organisms by their environment.

SOME of the external relations of organisms have been incidentally noticed * in our last chapter. Without such notice, the functions of organisms could not have been considered ; for respiration † and the formation of organic matter,‡ take place through interactions between living organisms and their inorganic environment. The processes which are necessary to effect the nutrition of organisms § which feed upon other organisms, and the phenomena of parasitism,‖ also involve external relations between living creatures of different kinds. But these matters need now to be considered somewhat more at length. As the relations which exist between organisms and the inorganic world have been already sufficiently explained for the purpose of the present work, the other external relations of organisms may be treated of under three heads—(1) their relations to time ; (2) to space ; and (3) to one another.

* For an exhaustive notice of the influence upon organisms of their environment, together with a complete list of books and memoirs bearing on the subject, see a paper by J. Arthur Thomson, M.A., F.R.S.E., in the "Proceedings of the Royal Physical Society of Edinburgh," vol. ix., part 3, 1888.

† See above, p. 161.

‡ See above, p. 333.

§ See above, p. 336.

‖ See above, p. 334.

Relations to time and space.

It is generally known that different kinds of animals and plants have successively inhabited the surface of this planet. The order of that succession has been far from regular; the past duration of different groups of organisms having varied greatly. Many kinds of animals have become extinct in certain regions in historic times, and some have become also absolutely and universally extinct. Thus wolves have disappeared from England since the time of Henry VIII., while only seventy years ago the great bustard wandered over the South Downs and Salisbury Plain. The dodo, the rhytina, the great auk, and the dinornis have, more or less recently, become absolutely extinct.

The only evidences we possess of past life, is afforded us by the five kinds of fossils before described.* This record is an exceedingly imperfect one; remains of animals and plants having been only here and there exceptionally preserved by some favouring accidents, and often in a very fragmentary manner. In most cases such remains seem to have been transported by water for greater or less distances, and buried in mud; and creatures which live habitually in or near water, form a very large proportion of those the hard parts of which have been thus preserved.

We have no space for even the briefest catalogue of the most generally interesting fossils. One or two, however, must be mentioned which bear upon problems of special interest treated of in this work.

The Laurentian rocks, in spite of their enormous thickness, have as yet afforded little evidence of life, and that only of very lowly organisms; but when even the lower Cambrian rocks were deposited, many Echinoderms and Brachiopods, Mollusks and Arthropods, were already in existence, while sharks and sturgeons are Devonian, and huge Batrachians, called Labyrinthodonts, characterize the coal measures. In the secondary epoch there existed a multitude of large reptiles, such as the marine *Ichthyosauri* and *Plesiosauri*, the terrestrial *Dinosauria*, and the ærial *Pterosauria*, which then flew as bats do now. The tertiary strata introduce us to the remains of creatures belonging

* See above, pp. 313, 314.

to various orders of beasts which exist at present, and, during a portion of it, a very man-like, long-armed ape (*Dryopithecus*) dwelt in Europe. Organisms have evidently inhabited this planet through untold ages. It is possible, indeed, that even the Laurentian deposits may not lead us more than a minute step towards the commencement of life on the earth, although they seem to indicate a very considerable one towards that commencement.

It would be rash to deny that our own species may have appeared in Miocene times;* and many naturalists date man's origin approximately from somewhat before the Glacial epoch. But it is certain that man has witnessed great geographical changes, and the extinction of a considerable number of beasts, such as the mammoth, the woolly rhinoceros, cave bears, lions and hyænas, and other forms.

Plants and animals have very definite relations to space as well as to time. Each large portion of the earth's surface has its special plant-population, or "flora," as it has its special animal population, or "fauna." This is not the place to set out the details of organic geography; it will be enough to note that (1) South America, (2) Africa south of the Sahara, (3) Australia, and (4) India with its Archipelago, have each an interesting peculiar fauna, and that (5) North America on the one hand, and (6) Europe, with North Africa and Asia, on the other, are similarly, though less strikingly, characterized. Various species which now inhabit one or other of these areas, closely resemble certain tertiary fossils also found therein.

Inter-relations of organisms.

We may next consider the inter-relations of organisms. One great organic inter-relation, already noticed,† underlies all others, for animals cannot subsist without feeding directly or indirectly upon plants, while plants are nourished by the carbonic acid which the animal world gives forth in breathing. Every animal which lives on other animals is therefore restricted in its range, not only by the supply of animals fit for its food, but also by the supply of vegetal life fit for the nourishment of the animals on which it lives. The drainage of our fens kills plants on which the

* See above, p. 312.

† See above, p. 333.

grubs of the swallow-tailed butterfly feeds, and that insect is therefore rapidly becoming extinct. Its extinction would necessarily carry with it the extinction of any animal which absolutely needed that insect for its subsistence. Certain plants are benefited by ants, which are not only inimical to caterpillars and slugs, but serve even to protect such plants from cattle or from man himself. Thus the bull's-horn acacia maintains a standing army of these insects, providing them with lodging in certain special cavities, and with rations in the form of special nutritive outgrowths; and plants of the genus *Triplaris* are also similarly protected by ants, which lodge within its cavities and rush out in multitudes if the tree be touched or shaken, and bite furiously. One organism may benefit another by destroying the indirect enemies, or rivals, of such other. It is thus that around herdmen's huts in the Alps we find species of aconite, dock, chenopodium, and different plants which have gained an extensive footing through the destruction of other vegetation by the grazing herds which find the aconite, etc., unpalatable, and so, by constantly sparing them, unintentionally extend their range. Animals benefit others in very curious ways. Thus barnacles which fix themselves to and are carried about by whales are provided thereby with a larger supply of food, and lobsters, in the midst of the eggs which load their abdomen at certain seasons of the year, often carry about with them a sort of leech which feeds on such eggs as may die. A small fish has also been found to live within the interior of a sea-anemone, feeding on portions of the latter's food. Some ants are benefited by ants of a different species, which the former take captive when young, and which when full grown, turn to and do the domestic work of their captors, and even feed the latter and carry them about. Some organisms, again, benefit others by involuntarily disseminating their eggs or seeds. Thus birds notoriously disseminate seeds which they have swallowed, and sometimes do so by carrying them—or the eggs of small animals—in the mud which may adhere to their feet. Every one now knows how important, or indispensable, may be the aid given by the visits of insects to the fertilization of the flowers they visit. We find also

very many curious arrangements by which the visits of useful insects at favourable times are facilitated—by the opening, shutting, colours, or odours of flowers—or those of noxious creatures, or of any at unfavourable times, are avoided. Thus snails, slugs, and caterpillars may be kept from flowers merely by means of a group of prickles placed on those parts of the plant which have to be traversed to reach the flower. Insects visit a flower to eat the nectar it secretes, and its nectaries are often so placed as to make it certain that the insects which obtain the nectar should either fertilize the flower, or should go away with pollen grains so adhering to them as to cause them to involuntarily fertilize the next flower they visit. For it is often advantageous that a flower should not be fertilized by its own pollen, and many flowers are so constructed as to favour their fertilization by the pollen of other flowers. In no plants are the arrangements to ensure insect fertilization so curious and complex as in orchids. In their flowers the nectar is so stored that insects, in order to reach it, must carry away the pollen on their heads, so that they are forced to apply it to the stigma of the next flower they visit, which is thus fertilized. Plants the pollen of which is only carried accidentally by the wind, have sometimes each pollen grain furnished with a membranous expansion which greatly facilitates its carriage. Some islands where insects are rare, as Tahiti and the Galapagos Islands, have few flowering plants with conspicuous flowers. Yet in Juan Fernandez, where insects are very scarce, showy flowers are by no means deficient. Honey-eating birds with brush-like tongues, act much as insects do in fertilizing flowers.

In spite, however, of the manifest inter-relations between the forms of insects and the shapes and colours of flowers, a number of instances are to be found in which their shapes and colours do not answer any purpose of this kind. That a very prejudicial influence must be exercised by some kinds of animals on other animals and plants is obvious, since they feed on them. The Pacific Islands are exceptionally rich in pigeons, and this may be due to the absence from those islands of monkeys and all other arboreal mammals which devour

eggs. In Burchell's time, the district near the Cape called "Midlands," was covered by a luxurious greensward, with a few trees and bushes, with acacias, along the sides of the streams. The introduction of sheep first destroyed the grass, and then most of the shrubs and trees—a change which affected the rainfall, so that this region has been invaded by the hardy plants of the adjacent Karroo desert, and is, in fact, becoming an extension of the desert itself. St. Helena, when discovered in 1502, was entirely covered with forests (the trees drooping over its precipitous cliffs) with a rich flora of absolutely peculiar plants. In 1513 some goats (those enemies of the human race) were introduced, and in fifty years had multiplied into thousands. In 1810 the forests had been destroyed, and the goats were destroyed also, in the hope that the rich soil would reproduce its forest growth. Unhappily, however, the island was then planted with trees and shrubs from other countries, and these have so spread that now the indigenous flora is almost confined to a few patches on the central ridge of the island. Such is the rivalry, such the struggle for existence, continually going on between all kinds of animals and plants. The inter-relations which take place in this struggle may be most complex. Thus the destruction of cats may bring about the destruction of a clover which needs for its fertilization the visits of a certain wild bee, the nests of which are destroyed by mice. Therefore, destroying the cats helps the mice which injure the bees required by the clover. Similarly whatever tends to extirpate an insect, must tend to favour plants which are rivals of those which need that insect for their fertilization. This struggle is often so severe that an apparently very trifling advantage may lead to the enormous preponderance of one form and the extermination of others.

Next may be mentioned the curious phenomena collectively spoken of as *mimicry*. "Mimicry" is a close and striking, yet superficial, resemblance borne by some animal or plant to some different, perhaps very different, object. A familiar example of mimicry may be found in the bee and spider orchis, and in clear-winged moths, which may be mistaken for bees. One of the most per-

fect examples of mimicry is displayed by the insect called the "walking leaf," which in form and colour so closely resembles a leaf that it is difficult to find it when amongst real leaves, and so escapes its enemies. Other creatures, called "bamboo-insects," resemble a stick of bamboo, and the more so because they hang with their legs stretched out unsymmetrically. Many butterflies which belong to one group, mimic butterflies which belong to quite another group. Besides insects, various fishes, reptiles, birds, and even some beasts, appear to be unconscious mimics. Thus a kind of pipe-fish (*Phyllopteryx eques*) bears long, cutaneous appendages which imitate the forms of the seaweed amidst which the fish habitually lives. There is also a large kind of bat which mimics the leaves of the tree on the fruits of which it feeds; while another kind has, when at rest, the appearance of a large ripe fruit. Mimicry is generally protective, but not always so. Thus amongst plants, certain Euphorbias which grow in Africa so greatly resemble cacti that it is difficult to believe, when out of flower, that they are not really the plants they so resemble. Another close resemblance exists between *Eucalypti* and *Mimosæ* in Australia, and a certain fern (*Stangerda paradoxa*) closely imitates a cycad. The winged fruits of no less than four genera of Brazilian plants, belonging to three distinct natural orders, are alike, not only in the form of the wing, but in the very texture and arrangement of the veins, so that dissection is needed to detect the essentially different structures which exist beneath this great external similarity.

The facts of mimicry seem akin to those of the resemblance so frequently obtaining between the colour of an animal and that of adjacent objects—resemblances which many animals either permanently possess or temporarily assume. Of these instances there are legion—such as the sand-coloured snakes and lizards of deserts, and the green snakes of trees. Actual changes of colour in harmony with surroundings are shown by the ptarmigan, the variable hare, the ermine, and the arctic fox, and, most notably of all, by the chameleon. Mr. Leslie enclosed certain caterpillars of one kind in two boxes, one black, the other white, and he

found that the colour of the chrysalis in each case harmonized with the colour of the box. Mr. R. Holland also found the cocoons of the emperor-moth to be either white or brown, according as they were spun on paper, or amid dead grass, or on soil. Mr. E. B. Poulton has ascertained that in a large number of larvæ of a vanessa butterfly, surrounded by variously coloured papers, the colour of nearly all the pupæ were like, or related to, that of the paper about them. He has also found * that in five species of Lepidoptera the colour of the pupæ was influenced by the colour of their environment which surrounded them after they ceased to feed, and this even if they were blinded. Mr. Stebbing has also found that the chameleon-shrimp has the power of changing from a dark purple colour to glassy transparency. The protective effect of many of these changes is evident, but their action in some cases is problematical.

Modifications of colour and sometimes of form attend the advent of the breeding season. Then the colours not only of the plumage, but also of the cutaneous appendages, of various birds, become intensified, as does the brilliant coloration which exists locally in certain beasts. Then we hear the melodies of our songsters, the croakings of frogs, and the roar of rutting stags. Strange are the antics some creatures display to gain a mate. Exceptional beauty or vocal power may aid them in this, also strength or agility, for the rival males of many species fight fiercely.

We have already more than once referred to animal and vegetable parasites, and the inter-relations which exist between them and their hosts are obvious, as are those of such creatures as the wasp (*Sphex*) † and its victims. The number of animal parasites is immense, and vegetable parasites are also numerous. Our most familiar ones are, perhaps, the broom-rape (*Orobanche*), the tooth-wort (*Lathræa*), and the dodder (*Cuscuta*); but the most wonderful one is the immense *Rafflesia* of Sumatra.‡ No flowering plants are parasitic upon animals, but the great group of fungi, so many of which are parasitic upon plants, include

* See "Phil. Trans.," vol. clxxviii., 1887, B.
† See above, p. 359. ‡ See above, p. 334.

also kinds which are true parasites on animals. One common species grows in the bodies of flies, and another well-known form inhabits a New Zealand caterpillar. But the most wonderful and most important of all parasites are probably those most microscopic creatures forming countless swarms of bacteria, and minute organisms, such as the yeast-plant. It is to the changes which these creatures effect in organic matter submitted to their activity that we owe all our wines, vinegars, and beers, and all our cheese, and they appear to aid digestion even directly. To them we are also indebted for the changes of putrefaction and the removal of the countless dead animals and plants which would otherwise so accumulate as to encumber the earth and to stifle the world's organic life. We have long been accustomed to praise the beneficial action of hyænas and vultures and other animal scavengers. But the action of all such large organisms in this respect is utterly insignificant and inappreciable in comparison with that of bacteria. They are constantly tearing down the complex chemical compounds of which organic matter is composed * and restoring to the inorganic world, those various constituent elements which, as we have seen, † are everywhere seized upon by the vegetable world to build up into their own organic substance. But not only do these bacteria thus decompose dead organic matter; many of them attack the living body, and are the cause of various terrible diseases. Certain bacteria are distinguishable not by their forms but their functions. Some cannot live in air, but obtain oxygen from the tissues of their host; others cannot live unless supplied with oxygen by the atmosphere; some can sustain a high temperature, others perish at a much lower one. The most remarkable fact, however, concerning them is one which has been ascertained by M. Pasteur. He has found that the properties of different kinds of bacteria are modifiable by treatment; that some which are highly virulent, upon being made to live and propagate in a new environment, produce descendants which are but very slightly injurious. As the rapidity with which these organisms increase is enormous, we can easily in their case

* See above, p. 323. † See above, p. 334.

observe the transmission of effects through many generations. The physiological properties of bacteria have been thus ascertained to be modifiable, and permanently so, when the same conditions which produce the modification are persisted in. Nevertheless, M. Pasteur has found that by other treatment the virulence of normally virulent kinds can be restored to them. There are few amongst the external relations of organisms which are more important to man than the external relations of the microscopic and seemingly insignificant bacteria.

Effects produced on organisms by their environment.

That the circumstances under which organisms live have a modifying effect on both their structure and their functions, there is abundant evidence to show. Thus, in the first place, increased or diminished use of parts augments or diminishes their development and facility in their use. We see this with the blacksmith's arm and the ballet-girl's leg, as also in the dexterity acquired by those who frequently exercise themselves in any art,—as we find, for example, with musicians and vocalists. The use of soft, cooked food has diminished the size of the jaws both of civilized races of mankind and various breeds of dogs. The size of the bones and muscles which aid flight is greatly reduced in domestic ducks, and a wild species of water-hen from Tristan d'Acunha also has them of reduced size. The lungs and livers of domestic cattle are likewise of smaller size than in those of wild races.

But curious effects of the environment on organisms, independent of use and disuse of parts, are also to be noted. Thus, Mr. Wallace has pointed out that in the small island of Amboina, the butterflies (twelve species of nine different genera) are larger than those of any of the more considerable islands about it, and that this difference is an effect probably due to some local influence. In Celebes, a whole series of butterflies are not only of a larger size, but have a peculiarly modified form of wing. The Duke of York's Island seems, he tells us, to have a tendency to make birds and insects white, or at least pale, and the Philippines to develop metallic colours; while the Moluccas and New Guinea seem to favour blackness and redness in parrots and pigeons. Mr. Seebohm also informs

us that Kamskatka seems to exercise upon the colour of birds an influence similar to that of the Duke of York's Island. Species of butterflies which in India are provided with a tail to the wing, begin to lose that appendage in the islands, and retain no trace of it on the borders of the Pacific. The Æneas group of Papilios never have tails in the equatorial region of the Amazon Valley, but gradually acquire tails, in many cases, as they range towards the northern and southern tropics. Mr. Gould has said that birds are more highly coloured under a clear atmosphere than in islands or on coasts—a condition which also seems to affect insects—while it is notorious that many shore plants have fleshy leaves. *Ficus Stipulata*, grown on a wall, has small, thin leaves, and clings to the surface like a large moss or a miniature ivy. Planted out, it forms a shrub, with large, coarse, leathery leaves. Several kinds of maize brought from the hotter parts of America to Germany became changed in form in a few generations, while twenty different kinds of American trees, belonging to various orders, all differ from their nearest European allies in a similar manner—leaves less toothed, buds and seeds smaller, fewer branchlets, etc. English oysters transported to the Mediterranean, grow rapidly like the true Mediterranean oyster, altering their manner of growth and forming prominent diverging rays.

Setters bred at Delhi from carefully paired parents, had young with nostrils more contracted, noses more pointed size inferior, and limbs more slender than well-bred setters should have. Cats at Mombas, on the coast of Africa, have short stiff hairs instead of fur, and a cat from Algoa Bay, when left only eight weeks at Mombas, underwent a complete metamorphosis—having parted with its sandy-coloured fur. Pony breeds of horses have also independently arisen in different parts of the world possessing a marked similarity in their physical conditions. English greyhounds in Mexico, which could not support the fatigues of a long chase in the atmosphere of that country, had whelps which experienced no inconvenience of the kind. Nathusius states that pigs fed in youth with rich and abundant food, acquired shorter and broader heads. Mr.

Blyth has described the turkey in India as being much degenerated in size, utterly incapable of rising on the wing, of a black colour, and with enormously developed, long, pendulous appendages over the beak. Mr. Darwin, who has collected and published many of the cases above given came to consider* that he had by no means attributed effect enough to the direct action of the environment on organisms. But no cases of the action of the environment can well be imagined more remarkable than those already given † of the effect of surrounding colours on the colours of organisms themselves. Evidently external agencies act, in some cases with rapidity, on some organisms. Thus pressure soon thickens the skin of the human hand. A mucuous surface continually exposed, rapidly assumes the character of the external skin, and the roots of trees which are laid bare acquire the aspect of branches. Dr. Dallinger has found it possible, by persevering efforts, to enormously increase the power of endurance of heat possessed by some of the lowest and most minute organisms. This power of endurance increased suddenly at long intervals, thus affording an example of wonderfully marked organic functional changes. Very striking morphological changes have also been recorded ‡ as follows: Certain Arthropods § of the group Branchiopoda, when introduced in large numbers into very salt water, were changed from the form characteristic of one genus (*Artemia*) into that of quite another genus (*Branchipus*), which latter is not only larger, but has also an additional abdominal segment and a differently formed tail.

* See his "Life and Letters," 1887, vol. iii. p. 158. In a letter to Moritz Wagner he says: "In my opinion the greatest error I have committed, has been not allowing sufficient weight to the direct action of the environment, *i.e.* food, climate, etc. . . . When I wrote my 'Origin,' and for some years afterwards, I could find little good evidence of the direct action of the environment; now there is a large body of evidence, and your case of the Saturnia is one of the most remarkable of which I have heard." This was a case in which a number of pupæ were brought, in 1870, to Switzerland (Aargau) from Texas of a species of Saturnia widely different from European species. In May, 1871, the moths developed out of the cocoons (which had passed the winter in Switzerland), and resembled entirely the Texan species. Their young were fed on leaves of *Juglans regia* (the Texan form feeding on *Juglans nigra*), and they changed into moths so different, not only in colour, but also in form from their parents that they were reckoned by entomologists as a distinct species.

† See above, p. 374.

‡ See *Nature*, Jan. 8, 1876, p. 133.

§ See above, p. 318.

The same amounts of light, heat, moisture, etc., produce very different effects on different species, some being much less modifiable than others. Such, for example, is the case with the ass, the guinea-fowl, and the goose, as compared with the dog, the horse, the domestic fowl, and the pigeon. As has already been remarked,* processes of repair will take place the more readily in young subjects. Similarly it is probable that the action of the environment generally acts more promptly and intensely on the embryo than on the young after birth. The modifications which may result from the action of animal agencies on the embryo have been well shown by M. C. Dareste through his experiments on eggs.† There is a well-known case of a thorough-bred brood-mare, belonging to Lord Zetland, which had a foal by a quagga, and which, though subsequently united only with thorough-bred horses, continued to throw foals with quagga marks. Analogous effects are often produced when a thorough-bred bitch has been once lined by a mongrel. These cases show that certain influences brought to bear upon a female parent, change the environment of subsequent progeny, and so induce modification. We have already cited ‡ various instances of the inheritance of modifications accidentally or artificially induced. Such cases are, however, very rare.

There is evidence that certain variations are more apt to be inherited than others. Amongst those very apt to be inherited are skin affections, affections of the nervous system and of the generative organs, *e.g.* hypospadias and absence of the uterus. The last case is one, as before pointed out,§ which is especially interesting. It is often affirmed that modifications are never inherited unless they arise spontaneously, and are not produced by such influences as use, disuse, etc., there being little good evidence of the inheritance of the latter kind of modifications. But such modifications, depending as they often do on changes in deep-

* See above, p. 170.

† See "Archiv. de Zool. Exper.," vol. ii. p. 414; vol. v. p. 179; vol. vi. p. 31; also "Ann. des Sc. Nat.," 4th. series, "Zoologie," vol. iii. p. 119; vol. xv. p. 1; vol. xvii. p. 243; and his work entitled, "Recherches sur la Production Artificielle des Monstrosités."

‡ See above, p. 341.

§ See above, p. 174.

lying structures, are not easily to be noticed, and there has hitherto been no motive for seeking out and attending to them. Some evidence, as we have just seen, moreover, there absolutely is. But such objectors may well be asked, What are "spontaneous variations"? No effect can be produced without some cause, and the objectors referred to would never affirm that the cause of variation was an absolutely internal one. It must, then, in some way be due to the environment and to reaction between the environment and the organism (nascent or adult). We must attribute the special formation of the water-hen of Tristan d'Acunha, to inherited modifications of the kind. Thus, to a greater or less extent, not only single individuals, but whole races are modifiable by the direct action of the environment, such modification being in some cases most certainly inherited. The facts mentioned in this chapter, show that the geographical and geological relations of organisms harmonize with the view that a blood-relationship has existed between successive species of different strata, and co-existing forms of different regions. It also appears that in the struggle for existence, small differences of colour, form, or strength, may not only prolong the lives of individual animals, but also enable them to mate and breed. At the same time it is evident that surrounding conditions operate directly, and may even occasion a non-protective mimicry.* Many species of animals are defined † by the possession of apparently indifferent or even slightly disadvantageous characters. The bearings of these facts will occupy us in the last chapter.

With the statements of fact made in this and the preceding section, we terminate our rapid survey of the world and its inhabitants. We must next endeavour to ascertain what are the most general and ultimate scientific truths which the facts of nature, ascertained by the physical sciences, may be able to disclose to our intellect enlightened by those fundamental principles which we have seen to be absolutely and necessarily true. So we may hope to ascertain what things are evidently and what most probably true, and to learn "what is truth" as regards the nature and principles of action of the material universe and our own being.

* See above, p. 373. † *E.g.* the Potto (see p. 317).

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CHAPTER XXV.

NATURE.

A mechanical conception of nature, though useful as a working hypothesis, is in reality an irrational conception. Reason indicates that the world is made up of bodies, each of which is a *compositum* consisting of both matter and an active, immaterial principle; the two forming a substantial unity.

What science is—What we are—The soul—The correlation of forces—The mechanical philosophy—The undulatory theory of light—The nature of gases—The atomic theory—The nebular theory—Space—Time—Motion—Energy—Matter—Motion and thought—The inorganic world—The organic world—Animal automatism—What an organism is—Psychology and physiology—Organic symmetry—Vitalism—Five orders of immaterial principles—Generation—Intermediate temporary forms—Cosmical hypotheses—Existences, real and ideal—Reason in nature.

OUR pursuit of truth has now carried us through a brief survey of the world about us, and we have noticed many of the leading phenomena which form the subject-matter of various sciences. We have next to advance from the sciences, to the science of sciences, or science *par excellence*. Our endeavour must now be to obtain what knowledge we may of the highest truth which appears to us attainable by man's natural faculties. And here it may be well to repeat what was said at the outset of this work,* namely, that the inquirer after truth must trust only to the dictates of his own reason, and be careful to accept nothing as certain, except what his intellect, after patient and persevering thought, shows him to be evidently true. That in such an

* See above, p. 4.

inquiry considerable patience and perseverance may sometimes be necessary for persons not well versed in observations and reflections of the kind, should occasion no surprise, considering what a call there is for the exercise of the same virtues in the acquisition of any merely physical science. The object of the present section is to obtain the most complete knowledge we can of the nature of the universe about us: what it seems to be composed of, and what are the interactions of its various parts? what was its origin, if origin it had? what purposes, if any, seem to be proclaimed by it? what may be the history of its life, if life it has; and what may be anticipated in the future respecting it? In other words, the inquiry pursued in this section may be shortly expressed by the questions, "*What* things really are? *Why* things are? and *how* things have become what they are? It is to the consideration of the first of these questions exclusively that the present chapter is devoted.

What science is.

"*Felix qui potuit rerum cognoscere causas.*" No knowledge of mere phenomena, together with their successions and co-existences, suffice to constitute "science;" which must investigate the essential natures and causal actions of the objects of its study, even if it has to end by declaring that its investigations have led to no certain or positive result. The essence of "science" is a knowledge of "causes," and only when these have been investigated to the fullest extent which our powers and opportunities permit, will our knowledge merit such a name. Science has to do with self-evident, necessary truths—first principles which underlie and maintain every department of "physical science." The latter, therefore, great and noble as it is, is necessarily a subordinate science which must submit to be ruled and judged by that upon which its very existence depends; namely, the science of sciences or "philosophy."

Two opposite temptations beset the inquirer at his outset in pursuit of such supreme science. During the last two centuries physical knowledge has been so wonderfully augmented as to lead some persons to suppose that the further advance of our knowledge is absolutely unlimited—a supposition tending to much rashness of speculation and

much hasty and unjustifiable dogmatism. Other persons are much more impressed with the limitations to our knowledge, and the amount of previous error which the same progress has also seemed to reveal—an impression tending to intellectual paralysis and much hasty and unjustifiable scepticism. In our inquiry we must do our very best to avoid both these temptations. We must never shrink from declaring that to be true, the certainty of which is evident to our minds, however wonderful it may be. We must also be most careful not to declare anything to be certain which is not, after mature meditation, seen to be clearly evident and indubitably true. It may be well for any reader who feels tempted to doubt about his power of knowing, with absolute certainty, anything beyond phenomena and physical science, to reflect a moment on the fact that he himself knows that he knows, with absolute certainty, the very truth about what Omnipotence could or could not do; and this concerning matters which not only do not exist, but may be regarded as only hypothetically possible. Thus, let him suppose that Omnipotence might have made our world such as it is, save that *all* its birds were water-birds—like ducks, geese, etc. Then let him suppose that Omnipotence might have made our world such as it is, save that *none* of its birds were water-birds. He will then see that it is, and must eternally be and have been, absolutely impossible even for Omnipotence to have made both these possible states of our world simultaneously actual. Having reflected on this simple but evident truth, the reader, disposed to doubt his powers of perception, may proceed with more confidence to consider truths of a lower and more ordinary kind.

In setting out, then, to investigate as best we may the nature of the universe—"*what* it is"—let us first examine the tools with which we have to work, and the nature of the objects they have to work upon. In so doing we shall find that we have already been forced, in preceding sections, somewhat to anticipate certain questions of the highest science. Our "tools" are those active powers of mind which we know we possess. The "objects they have to work upon" include everything thinkable, even

the very thought itself which thinks. We have already seen in what certainty consists;* that we have supreme certainty of our own existence,† and also that there are absolute, primary, fundamental truths ‡ which are self-evident and need no proof. We have made sure § that there are valid processes of inference, and that what is thus inferred from true premisses, must itself be absolutely true. We have recognized the distinction ‖ between what is objective and what is subjective, and we have seen that objective conditions (objective concepts) must correspond with our subjective perceptions of certainty,¶ or else we are plunged in hopeless scepticism, the utter folly of which has** been fully recognized by us. Manifestly, if we can know nothing, all inquiry must be useless. We have also recognized the fact that we have two sets of faculties;†† one pertaining to the senses and bound down within the scope of the imagination, the other pertaining to the intellect and capable of conceiving truths to which the imagination could never attain. Of these two, we have further seen ‡‡ that intellect, and intellect alone, *must* be our supreme and ultimate criterion.

In the second section of this work we endeavoured to make it clear that we have certain evidence of the existence of a world, external to and independent of us. Trusting to the validity of the considerations therein put forward, it will here be assumed that we have a real and true knowledge of the existence of an external world—that we truly perceive about us a variety of real existences of various kinds, and a multitude of extended bodies. Amongst these extended objects is to be included that material frame which each of us knows as his own body. What each man knows as his really existing and persisting mind, he also knows in conjunction with that same body, the two somehow constituting a certain unity which he perceives and calls "himself."

What we are.

Thus, in setting out to consider the world about us, as to what it really is, we may best begin with that which is obviously the best and most intimately known to us of

* See above, pp. 11, 13. † See above, pp. 15–28. ‡ See above, p. 12.
§ See above, p. 53. ‖ See above, p. 35. ¶ See above, p. 137.
** See above, p. 7. †† See above, pp. 180, 203. ‡‡ See above, p. 113.

all, namely, our own self. In our own being, then, we perceive a most remarkable diversity in unity.* Of the continuous existence of thought it is impossible to doubt: thought which can reflect on itself, and recognize its own past and its distinctness from things external to it—so marking off the subjective from the objective. But reflection shows us that thought is action, or active energy, and that no action can exist by itself, but must evidently be the action of something. Therefore the permanence, or substantiality, must belong, not to the thought, but to that which thinks, or the thinking principle. In this permanent principle of our being, past and present meet and unite with anticipations of the future, in one continuous, conscious "self." Indeed, as Lotze has well said, our perception of the continuous or substantial unity of this principle reposes, not so much on our appearing to ourselves to be such a unity, as to our appearing to ourselves in consciousness at all. We know ourselves, by introspection, to possess the power of passing in consciousness from one thing to another, being aware all the time of our own persistence, as also of our occasional reflection upon our own conscious intellectual activity. Such a peculiar entity, or principle, aware of the kinds and directions of its intellectual activities, consciously present to them all, so that it is aware of the series of its states as a series, and capable of reviewing them in various orders, clearly cannot be itself multitudinous, but must be as much a unity as we can conceive any existence to be—that is, a simple unity.

At the very same time, with this enduring intellectual being of ours, we are aware that we also possess an extended, material body, made up of various parts and possessing various powers. This body is directly evident to all our senses. We most frequently see it, and we constantly feel it. We observe that it possesses the characters which pertain to all other material substances, and that it is subject to the action of gravity and of the various physical forces which affect all other bodies also. Its nature is thus widely different from that of the intellectual principle of our being. That principle must be an im-

* As to the unity of our faculties, see above, p. 263.

material principle, or else it would not exert its influence over the whole body, but would exist within it, as one kind of matter beside another kind of matter. As John Stuart Mill has said,* "thought" and "matter" are "not merely different, but are at the opposite poles of existence," and the opposite of material existence, is "immaterial being." Our thinking principle, or intellect, can, therefore, have no corporeal organ. The brain can be no "organ of mind," except in so far as it serves to elicit those mental images which are necessary † to the action of our intellect during life. The very words we have used in setting forth the subject of this chapter, serve to illustrate this profound antithesis between our body and our immaterial intelligence. We spoke ‡ of the powers of our mind as our "tools," and said that the objects they had to work upon included "everything thinkable, even the very thought itself which thinks." A tool which works upon itself, a knife which cuts its own blade, is, however, an entity utterly remote from, and contrary to, everything material. But we not only feel our body, but we know, and can reflect on the feelings we have when we feel it. We can look at it, and know that we see it; and not only are the feelings of our body united and unified in one sensuous faculty of "consentience," § but we can know that they are so. We can also turn back our mind on itself and recognize the consentience we experience. Thus, in spite of the profound diversity of power which exists between our thinking principle and our material body with its attendant sensations, they are diversities of what is one substantial unity. This substantial unity of nature is spontaneously apprehended by our common sense, and reflection only makes that apprehension clearer, while it also shows us the marvellous character which attaches to it. If I hurt my leg, it is as much "I" who suffer as it is I who think when I am thinking. "I" act as truly when I wash myself as when I reason about philosophy. The reciprocal action ‖ of these two sides of our being, soul and body, is notorious.

* See his three "Essays on Religion," p. 202.
† See above, pp. 88, 209.
‡ See above, p. 385.
§ See above, p. 183.
‖ See above, p. 267.

We all know how the receipt of distressing news may disturb the body's functions, and how a seemingly trifling bodily injury, or the consumption of a small quantity of alcohol, may effect the action of the mind. Can we, then, think that it is one immaterial principle which "thinks," and that there is another second immaterial principle which is the active agent in "feeling"? Such a supposition may be seen to be not only needless, but in conflict with evidence, when we reflect that we both know our feelings and also actually feel in thinking. But if feeling and thought are due to the energy of one immaterial, unifying principle, need we assert the existence of another to explain any one of our activities? We have already seen * how actions performed with sensation shade off into reflex actions and into organic activities in which sensation has no share, while these again graduate into active bodily processes in which even the nervous system itself may have no part. Yet all the organic activities, from the first development of the germ, to maturity and the production by generation of another human being, are unified in one life, which is the life of the whole organism in which, as we have seen,† the activities of all its various parts and organs are merged, sustained, and unified in one dominant activity. This immaterial principle, then, which is not distinct from our body, but forms one unity with it, governs all our acts. It directs our merely organic life-processes, our sensuous activities, and our most abstract thought. Its existence is needed to account for the regulation of our nervous system ‡ (which is itself a regulator of other systems); for processes of adaptation to new conditions; for processes of repair § and development, as well as for those instinctive ‖ and other activities or reactions of the whole body, which have been distinguished as constituting the "physiology of the individual." ¶

A little further reflection may make this fact yet clearer: We know that a whole multitude of actions which are at first performed with attention and full consciousness, come at last to be performed unconsciously. We know that

* See above, pp. 167–169. † See above, p. 176. ‡ See above, p. 168.
§ See above, p. 169. ‖ See above, p. 175. ¶ See above, p. 365.

effective impressions may be made on our organs of sense without our knowledge—our attention happening to be diverted at the time of their occurrence. We know that countless organic activities take place in us under the influence and control of the nervous system, which either never rise into consciousness at all, or only do so under abnormal conditions. Yet we see that those activities have the same essential nature, whether we feel and attend to them or not. The fact of our attention or inattention cannot alter that nature.* The immaterial principle of our being, then, evidently acts with intelligence in some actions, with sentience in many actions, but constantly in an unperceived and unfelt manner. Moreover, we have noted † that this same principle of ours undeniably intervenes as a cause in the chain of physical causation.

The soul.

This unifying principle thus regulating (while it performs) all the processes of life, is what we mean by "the soul." By it we are far indeed from meaning some numerically distinguishable entity, such as was supposed by Descartes to exist in man distinct from the life of his body, inhabiting the pineal gland or some other region of the brain, and devoted exclusively to thought. This fanciful notion, so common since the time of the just-mentioned writer, has been gradually expelled by physiological science (returning unknowingly to an older and a saner philosophy), which can find no evidence for the existence of any energy in man distinct from the living body itself. It is this figment which physiologists really deny when they object to the term "soul." But the existence of the soul in the sense here given to that term (which is the sense in which it was used by Aristotle) they cannot deny. The existence of the body may be denied (as we saw in our second section), and is denied by idealists; but the existence of the soul it is absolutely impossible to deny, since the act of denying it implicitly affirms its existence. It does so because, without the presence of some immaterial principle of individuation, our different mental

* The direction of our minds to various bodily functions (digestion, etc.) may more or less impair the perfection with which they are carried on; but this is, of course, an altogether different thing from altering their nature.

† See above, pp. 264–268.

acts (such as those we call sensations, imaginations, associations, apprehensions, and inferences) could not be united so as to constitute an act of judgment. But without an explicit judgment the existence of the soul cannot be denied, even in thought. Our being is thus a two-sided unity, which persists during life—a chain of immaterial activities accompanying a series of physical changes.* After death we have, of course, inanimate matter only. We know very well that the dead body of our friend is not our friend himself, and that something (necessarily unimaginable by us, as it is something our senses cannot perceive) is wanting, which existed during life. This, reflection shows us to be that immaterial, enduring principle of individuation with which we have the most intimate acquaintance in our own consciousness, and which makes our body (change as it may) our body, and makes our mind (change as it may) our mind. And our body notoriously does change, and has not that substantial persistence which we are conscious of in our intellectual life. Our body has been entirely renewed since we performed those earliest actions which we remember to have been *our* actions. Day by day the food we take becomes part of our body, and day by day our body divests itself of portions of its substance; yet *we* persist through all these mutations. It has sometimes been objected that this apparently persistent unity of ours is no more than the unity of a fountain, of which the variously directed jets of water, while they continue to be emitted, seem to constitute a persistent unity without being so in reality. But, in a certain sense, such a fountain is a persistent unity; so long, that is, as its various component substances continue to be disposed in such a way as to maintain the effect its construction was intended to produce. But its unity is altogether extrinsic. It possesses no internal powers of maintenance, growth, and repair such as our living body possesses. If it had these, it would be truly a unity, and then the very evanescence of its material particles as they flow, would only serve to make more plain the presence of a permanent internal principle of individuation effecting

* See above, p. 266.

those processes. But this principle of individuation of ours which is revealed to us by consciousness and reflection, is (as we shortly before observed) not only the opposite of matter—that is, immaterial and simple—but it also has an immaterial nature altogether *sui generis*, inasmuch as the whole material universe shows us nothing else like it. Being able, as we lately observed,* to recognize the past as past, the future as future, and to reflect on its own successive experiences, it must be different *in kind* from the active principle of every other known organism. Moreover, we can directly perceive no being but man who is able to determine his acts freely, and of his own will to interpose and change the whole course of subsequent physical causation. Such an active principle, capable of acting freely under the guidance of its own intelligence, evidently requires to be distinguished from the existences of a lower nature, by some term which may distinctly mark its radical distinctness from every kind of active principle and every power or faculty not thus endowed. The principle animating every human being may, then, be distinguished as "spirit" from every power, principle, or form of energy not thus gifted, while every human being, as a being endowed with true intelligence and free-will, may be termed a "person" in contradistinction to all lower beings which have not such powers.

From the time of Thales † certainly, and probably from a period much more remote, the highest minds have occupied themselves with speculations and reasonings concerning the nature of the universe. There is no space here for even the briefest sketch of the history of philosophy. ‡ Such a subject would also be altogether foreign to our aim, which is the investigation of truth itself, and not of the ways in which it has been sought. It suffices for our purpose to advert briefly to one or two philosophical systems which have, or have had, wide popularity, and whose principles, consciously or unconsciously imbibed, may tend to obscure the reader's apprehension of views

* See above, p. 387. † Born 640 B.C..

‡ The reader may consult Dr. Friedrich Ueberweg's "History of Philosophy," translated by G. S. Morris, M.A. (London: Hodder and Stoughton, 1872).

here to be put forward as certainly, probably, or possibly true, as the case may be.

The correlation of forces.

One of the most striking and fruitful discoveries of modern times has been the discovery that the physical forces (light, heat, motion, chemical activity, electricity, etc.) have exact relations of quantitative equivalence,* instead of being, as previously supposed, independent of any such definite correlation. This discovery led to the conception of the physical forces being actually transformable one into the other, and thus rather different manifestations of one force than radically different forces. This conception has been vividly expressed by calling "heat" a "mode of motion," and the tendency has arisen to consider all other forces as motion in some or other form or condition. Of late, physicists have more or less discarded the term "force" in favour of the word "energy," the latter being used to denote phenomena which can be measured, and the facts of correlation are now differently expressed. It is rather said, for instance, that motive energy is changed into heat energy, and the reverse, than that "forces" are transformed. The fundamental conception, however, is not really changed by this more guarded form of expression, for however much it may be desired to refer only to the actual phenomena observed, and not to any "force" as the cause of them, the intellectual necessity of the idea of causation and a physical or mechanical cause, will always be, consciously or unconsciously, assumed when no other is postulated. Another force, however, was postulated to explain the phenomena of living beings, and spoken of as "vital force," and so the universe came to be regarded as an assemblage of material bodies—solid, fluid, and gaseous—with two kinds of force, one (physical force) acting in all of them, the other (vital force) only acting in organized bodies.† This hypothesis is known as "vitalism." For reasons, however, which will be enumerated later on, the idea of a distinct vital force fell into greater and greater discredit, and it was sought to explain all the phenomena of life by the idea of motion.

Long before the discovery of the quantitative equivalence

* See above, p. 301. † See below, p. 430.

of the physical energies, a great many substances had been analyzed and resolved into various chemical elements, and exact quantitative relations * as to weight, had been found to exist between such elements. This has led to the conception and general adoption of what is known as the "atomic theory," according to which the various elementary substances consist of "atoms," while the more complex substances consist of "molecules," each molecule consisting of groups of definitely combined atoms. A further step was taken when the energy of the various physical forces acting in any substance came to be considered as being actually, but different "modes of motion" of the molecules composing such substance. On "vital force" being discarded, in favour of merely physical force, as an explanation of the phenomena of life, all the actions of living beings came also to be explained as forms of motion, either motions of large parts (as in the movement of limbs), called "molar motion"; or motions of minute parts—minute waves or oscillations (as *e.g.* supposed to exist in the action of nervous tissue †), called "molecular motion." Ultimately, even "feeling" and "thought" were imagined as being either actually different "molecular motions" or as the mysterious, inexplicable accompaniments of one kind of molecular motion — namely, the minute motions of the particles forming certain tracts of nervous tissue in the brain. Thus, according to this material, or mechanical, conception of the universe, nothing exists but unimaginably minute, distinct, separate particles distributed throughout space, grouped in the most varied and complex systems, and systems of groups of groups of groups of groups (to any extent needed for the theory), every ultimate atom, and each set of atoms forming a molecule, and each group and series of molecules having each and all their own set of minute motions. In a word, the universe is thus supposed to consist of myriads of myriads of particles incessantly performing all sorts of minute gyrations, throughout a time without beginning and without end, unless when that form of motion, termed heat, becomes everywhere equally diffused. Then the whole process will either end by

The mechanical philosophy.

* See above, p. 303. † See above, pp. 147, 150, 164.

producing an universal balance or "equilibration" in an infinitely extended nebula of atoms—equivalent to universal death—or will begin again (as a system of perpetual motion), through collisions and concentrations, to redistribute heat and motion unequally. Thus we should have an eternal rhythm of change from atoms in a nebula, to worlds of atoms; and from worlds to nebula again, and so on without end. Such is the ultimate synthesis and system of causes which constitutes a very popular philosophy of our day, much as it did in the old days of Democritus.* The essence of every body, living or inorganic, is conceived of as a plexus of solid particles in certain states of active motion.

The reader new to such speculations may deem it all but incredible that such a conception can really be entertained by eminent and distinguished men. Nevertheless, a passion for considering nature as a mere mechanism of matter and motion, and all its actions as merely mechanical, is a tendency of our day. It is the scientific ideal of a very large and very influential school of thinkers,† and is the goal towards which they strive; and in so striving they only follow the lead of the earliest of modern philosophers, Descartes.‡

The convenience of mechanical hypotheses for the purposes of calculation is indisputable; but from the practical use of such hypotheses to their real acceptance as truths, is a very long step. The former mode of proceeding no prudent physicist will neglect; the latter no

* Born about 460 B.C.

† Thus Kirchenoff has said ("Protectoratsrede." Heidelberg, 1865): "The highest objects at which the natural sciences are constrained to aim is the reduction of all the phenomena of nature to mechanics;" and Helmholtz has declared ("Populaer Wissenschaftliche Vorträge," 1869), "The aim of the natural sciences is to resolve themselves into mechanics." Wundt observes ("Lehrbuch der Physiologie des Menschen"), "The problem of physiology is a reduction of vital phenomena to general physical laws, and ultimately to the fundamental laws of mechanics;" while Haëckel tells us ("Freie Wissenschaft und freie Lehre") that "all natural phenomena, without exception, from the motions of the celestial bodies to the growth of plants and the consciousness of men . . . are ultimately to be reduced to atomic mechanics." Professor Huxley also speaks of "that purely mechanical view toward which modern physiology is striving," and has said "if there be one thing clear about the progress of modern science, it is the tendency to reduce all scientific problems, except those which are purely mathematical, to questions of molecular physics; that is to say, to the attractions, repulsions, motions, and co-ordinations of the ultimate particles of matter" ("Lay Sermons," p. 183).

‡ Born A.D. 1594; died A.D. 1650.

really rational man, sufficiently informed and unenslaved by prejudice, will be guilty of. The use of mechanical conceptions, even with respect to the science of living beings, is not only blameless but natural and useful, as will be shortly pointed out; but its absolute acceptance leads to downright absurdity. To call "pains" and "pleasures," "modes of motion," is not to explain them, but simply to apply words wrongly and to mislead the unwary. For the sake of going to the very root and origin of such a mistaken conception, it may be well first to test the value of the prevalent mechanical theory on what may be considered its own special ground—the lifeless, inorganic world. If we find that even in the domain of pure physics, widely accepted mechanical views have little chance of being able to maintain their hold, we shall be able to investigate with more profit the mechanical view of the phenomena of life. We will, then, briefly pass in review one or two of the most widely accepted mechanical theories of the physical world, not with the intention of denying all truth to them, but to show that much may be reasonably urged against an entire and unreserved acceptance of any one of them.

The undulatory theory of light.

One of these modern conceptions which has met with general acceptance is that of the undulatory theory of light. According to it, that mysterious entity is but an unimaginable multitude of unequal waves * of a universally diffused lumeniferous ether; the prismatic colours of the spectrum being due to the separation of waves of different lengths, unequally retarded in their passage through some refracting body. Now, it has often been objected to the undulatory theory, that if different colours are, like different musical notes, but differences of wave-lengths, then no dispersion such as that which is produced by the spectrum, ought to take place with respect to light, since it does not do so with respect to sound. This objection, always recognized as a formidable one, has been met by the hypothesis that the velocities of the several coloured rays may vary according to the wave-lengths if it be assumed that the ethereal medium of propagation, instead of being continuous, con-

* See above, p. 300.

sists of particles separated by sensible distances. But are these coloured rays propagated with different velocities? This is a question, as has been recently pointed out,* which astronomy seems able to test; and, so far, its decision is adverse to the undulatory theory. We experience the sensation of white light when all the chromatic rays of which it is composed strike the eye simultaneously. The light proceeding from a luminous body will appear colourless, even if the component rays move with unequal velocities, provided all the rays, which together make up white light, concur in their action on the retina at a given moment; in ordinary cases it is immaterial whether these rays have left the luminous body successively or together. But it is otherwise when a luminous body becomes visible suddenly, as in the case of the satellites of Jupiter or Saturn, after their eclipses. At certain periods more than forty-nine minutes are requisite for the transmission of light from Jupiter to the earth. Now, at the moment when one of Jupiter's satellites, which has been eclipsed by the planet, emerges from the shadow, the red rays, if their velocity were the greatest, would evidently reach the eye first, the orange next, and so on through the chromatic scale, until, finally, the complement of colours would be filled up by the arrival of the violet ray, the velocity of which is supposed to be the least. The satellite immediately after its emergence would appear red, and gradually, in proportion to the arrival of other rays, pass into white. Conversely, at the beginning of the eclipse, the violet rays would continue to arrive after the red and other intervening rays; and the satellite, up to the moment of its total disappearance, would gradually shade into violet. But the most careful observation of the eclipses in question have so far failed to reveal any such variations of colour, either before or after emersion, the transition between light and darkness taking place without chromatic gradations.

Astronomy points to several other phenomena which

* See "The Concepts of Modern Physics," by J. B. Stallo (Kegan Paul, Trench & Co.), p. 95. The criticisms of this book have been warmly praised by some of the first physical experts, though its author (like ourselves) makes no claim to be considered an expert in physics.

are equally at war with the doctrine of unequal velocities in the movements of the chromatic undulations. Fixed stars beyond the parallactic limit, the light of which must travel more than three years before it reaches us, are subject to great periodical variations of splendour; and yet these variations may be unaccompanied by variations of colour. Again, the assumption of different velocities for the different chromatic rays is discountenanced by the theory of aberration. Aberration is due to the fact, that in all cases where the orbit of the planet on which the observer is stationed forms an angle with the luminous ray, a composition takes place between the motion of the light and the motion of the planet, so that the direction in which the light meets the eye is a resultant of the two component directions—the direction of the ray, and that of the observer's motion. If the several rays of colour moved with different velocities there would evidently be several resultants, and each star would appear as a coloured spectrum longitudinally parallel to the direction of the earth's motion.

The allegation of a dependence of the velocity of the undulatory movements, which correspond to or produce the different colours, upon the length of the waves, is thus at variance with observed fact. The hypothesis of "finite intervals" is unavailable as a supplement to the undulatory theory; other methods will have to be resorted to in order to free this theory from its difficulties.

We readily acknowledge that the hypothesis has the merit of accounting for the phenomena of optics up to the time of its promulgation. We readily acknowledge also that through it a number of facts were predicted which have been subsequently discovered. But as right conclusions are often drawn from wrong premisses, successful predictions by no means suffice to prove an hypothesis to be true, though they justly serve to accredit it. When an hypothesis successfully explains a number of phenomena with reference to which it was constructed, it is not strange that it should also explain others connected with them that are subsequently discovered. There are few discarded physical theories—*e.g.* the one-fluid theory of electricity and the corpuscular theory of light—that could not boast

the prevision of some phenomena to which they pointed, and which were afterwards actually observed.

We may, indeed, be ready to accede to the demands of the theorist when he asks us to grant that all space is pervaded, and all sensible matter is penetrated, by an adamantine solid exerting at each point in space an elastic force of 1,148,000,000,000 times that of air at the earth's surface, and a pressure upon the square inch of 17,000,000,000,000 pounds. We may be ready to grant the existence of such a solid as this, startled as we must be at the fact that it is one which wholly eludes our senses, and offers no resistance to the movements of ordinary bodies. But we cannot but be appalled and staggered when we are told not only that the alleged existence of this adamantine medium—the ether—does not, after all, explain the observed irregularities in the periods of the comets, and that it is unavailable for explaining electrical phenomena, unless a distinct electriferous ether must be assumed;* as also that it is very questionable whether all the now known facts in optics † can be explained without assuming that the luminiferous ether consists of two distinct media.‡ In spite, then, of its convenience as a working hypothesis, we must at least meet the zealous advocates of this undulatory theory of light with the prudent Scotch verdict, "not proven."

The nature of gases.

Another modern but very minor physical hypothesis is one concerning the nature of gases, first advanced by Krönig.§ The assumptions of this theory are that a gaseous body consists of a great number of minute solid particles in perpetual rectilinear motion, which, as a whole,

* W. A. Norton, on "Molecular Physics," *Phil. Mag.*, 4th series, vol. xxii. p. 193.

† As, for instance, the non-interference of two rays originally polarized in different planes when they have been brought to the same plane of polarization, and certain phenomena of double refraction, in view of which it is necessary to suppose that the rigidity of the medium varies with the direction of the strain—a supposition discountenanced by the facts relating to the intensities of reflected light.

‡ Two media, each possessed of equal and enormous self-repulsion or elasticity, and both existing in equal quantities throughout space, whose vibrations take place in perpendicular planes, the two media being mutually indifferent, neither attracting nor repelling. See Hudson on "Wave Theories of Light, Heat, and Electricity," *Phil. Mag.*, 4th series, vol. xliv. p. 210.

§ And since elaborated by Clausius, Maxwell, Boltzmann, Stefan, Pfaundler, and other physicists of the highest note.

is conserved by reason of the absolute elasticity of the moving particles, while the directions of the movements of the individual particles are incessantly changed by their mutual encounters or collisions. The colliding particles are supposed to act upon each other only within very small distances, and for very short times before and after collision; their motion being free, and consequently rectilinear, in the intervals between such distances and times. The durations of the rectilinear motions in free paths are, moreover, assumed to be indefinitely large as compared with the durations of the encounters and of the mutual actions.

But how and why is the elasticity of an atom one bit less in need of explanation than the elasticity of a bulky body? What argument from analogy can experience show (and to abandon experience is to abandon the very groundwork of physical science) in favour of the existence of bodies such as the atoms supposed? For these atoms are supposed to move, except on the very verge of immediate contact, independently, without mutual attraction or repulsion, or any sort of mutual action. Where else in the whole of nature can we find bodies such as those supposed —bodies which have a violent mutual action just before and after their collisions, and yet are totally free from such action during the comparatively long periods of their rectilinear motion along "free paths"? Not only, therefore, does this hypothesis conflict with experience, but it assumes the existence of properties it is intended to explain.

The atomic theory.

Let us next turn to the great atomic theory itself. The doctrine that an exhaustive analysis of matter into its real elements, if it could be practically effected, would yield an aggregate of indivisible and indestructible particles, is one of the earliest products of human speculation. All its modern supporters, however they may disagree in details, agree in holding that the atomic theory involves three such propositions as the following—

1. Atoms are persistent, indestructible, and indivisible, and they are unchangeable both in weight and volume.

2. Atoms are separated by void interstitial spaces, and

such atoms constitute matter; the expansion or contraction of a body being simply the increase or decrease of the intervals between the atoms.

3. The atoms of chemical elements are of determinate specific gravities.

Let us consider these three propositions, by the truth or falsehood of which the atomic theory itself must stand or fall. The first is valued as accounting for the indestructibility of matter. Will it do so? As Mr. Stallo remarks:* "Surely the hypothetical recurrence of a fact in an atom is no explanation of the actual occurrence of the same fact in the conglomerate mass. Whatever mystery is involved in the phenomenon is as great in the case of the atom as in that of a solar or planetary sphere. Breaking a magnet into fragments, and showing that each fragment is endowed with the magnetic polarity of the integer magnet, is no explanation of the phenomena of magnetism. A phenomenon is not explained by being dwarfed, and theory is not transformed into a fact by being looked at through an inverted telescope."

The second proposition is valued as serving to explain such physical phenomena as the dispersion and polarization of light. Will it do so? In our review of the undulatory theory of light, we have already seen that some observed phenomena do not accord with it, and thus this second proposition is denied that positive support which it has been too hastily supposed that optics give it. But as Mr. Stallo observes:† "This negative evidence is reinforced by positive evidence derived from a branch of the atomic theory itself—the modern science of thermodynamics. Maxwell has remarked, with obvious truth, that such 'a light-bearing "medium" as the undulatory theory supposes' (whose atoms or molecules are supposed to penetrate the intermolecular spaces of ordinary substances) would be nothing more nor less than a gas, though a gas of great tenuity, and that every so-called vacuum would in fact be full of this rare gas at the observed temperature and at the enormous pressure which the ether, in view of the functions assigned to it by the undulatory

* *Loc. cit.*, p. 88. † *Loc. cit.*, p. 97.

theories, must be assumed to exert. Such a gas, therefore, must have a correspondingly enormous specific heat, equal to that of any other gas at the same temperature and pressure, so that the specific heat of every vacuum would be incomparably greater than that of the same space filled with any other known gas. This remarkable consequence is not only without experimental warrants, but—inasmuch as it would apply to all vacua, including the intermolecular spaces of ordinary bodies, of whatever state of aggregation —is in effect a fatal aggravation of a peculiar difficulty of the molecular theory, which is in itself formidable to the highest degree."

The third proposition—the determinate specific gravities of the atoms—is deemed to be the explanation of the phenomena of chemical composition and decomposition. Will it serve as such? Now, the phenomena may be conveniently arranged in three classes: (1) the persistence of weight and the combination in definite proportions; (2) the changes of volume and the evolution or involution of energy; and (3) the emergence of a wholly new set of chemical properties—as in the composition of oxygen and hydrogen to form water, or the decomposition of rust into iron and oxygen.

Mr. Stallo continues: "Obviously the atomic hypothesis is in no sense an explanation of the phenomena of the second class. It is clearly and confessedly incompetent to account for changes of volume, temperature, and latent energy. And with the phenomena of the third class it is apparently incompatible; for in the light of the atomic hypothesis, chemical compositions and decompositions are in their nature nothing more than aggregations and segregations of masses whose integrity remains inviolate. But the radical change of chemical properties, which is the result of all true chemical action, and serves to distinguish it from mere mechanical mixture and separation, evinces a thorough distruction of that integrity. At best, then, the hypothesis of atoms of definite and different weights can be offered as an explanation of the phenomena of the first class. Does it explain them in the sense of generalizing them, of reducing many facts to one? Not at all; it

accounts for them, as it professed to account for the indestructibility and impenetrability of matter, by simply iterating the observed fact in the form of an hypothesis. It is another case of illustrating *idem per idem*. It says, 'The large masses combine in definitely proportionate weights because the small masses, the atoms of which they are multiples, are of definitely proportionate weight.' It pulverizes the fact, and claims thereby to have sublimated it into a theory."

In the words of Sir William Thomson, "The assumption of atoms can explain no property of a body which has not previously been attributed to the atoms themselves."

Of course, by the foregoing contention we are far from meaning to deny that the atomic theory has done very great service to the cause of chemical science, and that it may do much more. Still, there are now not wanting distinguished men of science who are disposed to agree with Cournot * in declaring that "the belief in atoms is rather a hindrance than a help;" and the late Sir Benjamin Brodie (Professor of Chemistry at Oxford) did not hesitate to declare that "the atomic doctrine has proved itself inadequate to deal with the complicated system of chemical facts which has been brought to light by the efforts of modern chemists," or to express his belief that the atomic theory has not "succeeded in constructing an adequate, a worthy, or even a useful representation" of chemical facts.

One of the most strenuous advocates of the atomo-mechanical theory, and a persistent stickler for its dominant features, has expressly declared that "the scientific imagination which is authoritative demands, as the origin and cause of a series of ether waves, a particle of vibrating matter quite as definite, though it may be excessively minute, as that which gives origin to a musical sound. Such a particle we name an atom. I think the seeking intellect, when focussed so as to give definition without penumbral haze, is sure to realize this image at the last." Yet, as to this, Mr. Stallo observes: † "It requires but little reflection to see that the realization of definite atoms or molecules susceptible of, but pre-existing to, motion, in the

* "Traité de l'Enchainement des Idées," i. 264. † p. 156.

focus of this writer's 'seeking intellect' is sheer delusion. Let us for a moment contemplate an ultimate particle of matter in its state of existence in advance of all its motion. It is without colour, and neither light nor dark; for colour and lightness are, according to the theory of which he is a distinguished champion, simply modes of motion. It is, similarly, without temperature, neither hot nor cold, since heat, also, is a mode of motion. For the same reason it is without electric, magnetic, and chemical properties: in short, it is destitute of all those qualities in virtue of which, irrespective of its magnitude, it could be an appreciable object of sense, unless we except the properties of weight and extension. But weight is a mere play of attractive forces; and extension, too, is known to us only as resistance, which, in turn, is a manifestation of force, a phase of motion. Thus the difficulty of grasping these primordial things lies, not in their excessive minuteness, but in their total destitution of quality. The solid, tangible reality craved by such 'scientific imagination' is '*nec quid, nec quantum, nec quale*,' and wholly vanishes from the 'seeking intellect' the moment this intellect attempts to seize it apart from the motion which is said to presuppose it as its necessary substratum." Moreover, if we allow even solidity to these atoms, then also, according to this mechanical philosophy, nothing exists, or can exist, but perfectly dry, hard, solid particles; and there can be no such thing whatever as either a real fluid or a real vapour in the whole universe!

The nebular theory.

Passing from the infinitely small to the largest bodies known to us, we will lastly advert to that ingenious and widely popular conception, the "nebular theory." The nebular theory, originally due to Kant,* is a prominent feature of the general mechanical conception of the universe. It is an attempt to deduce that universe from matter and motion only, by the application exclusively of mechanical principles. The theory may be shortly stated as follows: Primordially, the materials which now form all the complex bodies of our planet, the solar system, and the whole sidereal universe, were uniformly dispersed throughout

* "Naturgeschichte des Himmels." 1755.

space. By the action of physical forces (above all by that of attraction, or gravity) this uniform mass of attenuated matter began to rotate and divide into vast nebular spheres. These spheres, as they gradually cooled, contracted, and also revolved the more rapidly the more they contracted. With the increase of the velocity of rotation, the centrifugal force in the equatorial regions of each rotating sphere also increased, causing it to become flattened at the poles, and eventually to detach successive equatorial zones, which at first circulated round the residual mass—in the case of our own system round the sun—in the direction of its original rotation. These rings broke up into a greater or less number of smaller spheroids owing to various irregularities in their form or composition, thus giving rise to the planets. Each thus formed planet began to revolve and condense, again throwing off one or more portions, thus constituting our moon and the various other satellites. Many interesting astronomical, and some terrestrial, facts harmonize with this hypothesis; but others seem to be fatal to it.

In the first place, there are enormous discrepancies between the actual orbital periods of the planets and the corresponding periods found by calculation according to the nebular hypothesis, as was pointed out twenty years ago by M. Babinet. Moreover, several of those confirmations of the theory which were formerly supposed to exist, have been disproved by the progress of astronomical discovery. Thus the planet Uranus * supplies us with an exception to the uniformity in direction of the axial and orbital motions of the planets and their satellites; the orbital planes of its satellites being nearly perpendicular to the ecliptic, and their paths round their planet being retrograde. More serious still, one of the two recently discovered satellites of Mars revolves about that planet in less than one-third of the time required for the planet's axial rotation. Yet, if the nebular theory is true, the orbital motions of a satellite are but continuations of the axial motions of the materials out of which such satellite was formed! Its orbital period, therefore, ought to be at

* See above, p. 301.

least nearly equal to the planet's own rotation at the time when it cast off that satellite. But its period of rotation must have been greater than its present period, owing to the acceleration which must have taken place through the planet's subsequent contraction. Yet this satellite of Mars revolves more quickly than does its now contracted parent! The radical inconsistency of this fact with the nebular hypothesis is undeniable.

Two subsidiary hypotheses, however, have been put forward to help the distressed nebular theory out of its straits. The first of these is (1) that the planet's period of rotation has been retarded by tidal action. The second is (2) that the orbits of the satellites have been contracted, and their orbital periods accelerated, by the resistance of an ethereal medium. As to the first of these subsidiary hypotheses, tidal retardation could only at the very most produce a *coincidence* of the period of a satellite's orbital revolution with that of its planet's rotation round its own axis. As to the second subsidiary hypothesis, we have already pointed out the difficulties respecting the ethereal media imagined by physicists; and the effect of such a resisting medium would surely be to retard the motion of revolution itself, as well as to contract the satellite's orbit.

But if the nebular hypothesis, the atomic theory, the kinetic theory of gases, and the undulatory theory of light, are to be regarded as but imperfect hypotheses, useful in their season and for certain purposes, but with no pretensions to be absolute truths, what are we to think of the great mechanical conception of the universe as a whole? And when from the inorganic world we pass to the domain of life, what sane man can doubt but that the wonderful and various qualities of colour, odour, and the beautiful variety of leaf and frond, are due to deeper agencies than the incidence of light or heat with the co-operation of other physical influences?

Still more marked in animal sensations and the complex varieties of instincts, is the agency of something more than groups of physical forces. Even if mere mechanism would explain all the phenomena of the inorganic world,

such an explanation is inadequate indeed to elucidate the activities of living creatures.

Before, however, attempting to grapple with the problems presented to us by the living world, we must first consider more deeply those conceptions upon which this whole mechanical philosophy is based. It is based upon the conception of matter with its physical forces variously moving with a mechanical necessity, during countless ages of past time and throughout unfathomable abysses of space. Let us therefore consider with a little care the ideas "space," "time," "motion," "force," and "matter."

Space.

All the corporeal bodies we can see or think of, are commonly spoken of as occupying a certain limited portion of "space." Is "space," then, a reality of which we have an intuitive perception; is it a form of thought into which our mental nature compels us to throw every one of our perceptions or imaginations of corporeal things; is it no real idea at all, but a mere amalgam of certain sensations, or is it a true abstract idea gained by us from experience? It is not a thing intuitively perceived; for many persons who have deeply pondered over the question deny that they have any such perception at all, and certainly the present writer has none such. Any one who asserts that he himself has such a perception should be asked to describe what it is he perceives. No one pretends that space has any character except a power of receiving extended bodies within it. If, then, we imagine all extended bodies perceptible by the senses to be annihilated, there would remain a mere empty power or potentiality, the existence of which by itself the mind sees to be positively impossible. If it is urged that there may be something inconceivable by us which possesses this power, we may reply thus: Of course, we cannot reasonably affirm that there are no things merely passively inconceivable * by us which may not be true, yet it would be in the highest degree unreasonable to assert the existence of any such thing when the facts upon the strength of which its existence is asserted can perfectly well be explained without it. When ordinary and known causes suffice to explain anything, we

* See above, p. 41.

must never idly have recourse to an assertion of extraordinary and inconceivable causes. The second supposition, namely, that space is a mental form or mould into which our organizations compel us to throw our conceptions of extended things,* is less unreasonable than a belief in the objective reality of an inconceivable entity, space. But this second supposition is a form of idealism (since it denies we have any valid perception of real extended bodies), and idealism has, we trust, been already sufficiently refuted in our second section. The third hypothesis supposes that our idea of space is nothing more than an amalgam of feelings of motion and tactual and visual sense-impressions of all kinds, the structure of the retina especially enabling us to note different objects simultaneously, and so giving us the feeling of unoccupied place. It is urged that, since each set of motions and sense-impressions experienced, tends to call up, indistinctly, past trains of similar feelings; the simultaneous presentation of an indefinite multitude of such relations will give rise to a sense of freedom of motion, together with the feeling of unoccupied place. This, it is said, is the same thing as our idea of space. But however we may *feel* different "positions" and "motions," we cannot *think* them without having the idea "extension" † already present to our minds. The sensations due to the positions and motions of bodies may, and doubtless do, serve to elicit the idea extension; they are the means by which our minds are aroused to the perception of the extension of objects, and may account for the actions and spatial sense-cognitions of brutes. Our organization is formed, like that of animals, to obtain by the senses a sense-cognition of extended bodies. So far, then, these sense-experiences serve us; but we have an intellect which is able to apprehend that bodies have an extended quality, and to conceive the abstract idea "extension." Once elicited, we see that this idea is most inadequately represented by "positions" and

* This, as every one knows, was the hypothesis of Kant, who sought to disprove the validity of human reason by reason; to show certainty by what is uncertain, and to arrive at infallible truth by means professedly fallacious.

† The relation of our bodily sensations to our *feeling* of extension as distinguished from the *idea* has been already pointed out (see above, p. 191).

"motions." It is, indeed, a primary, fundamental idea incapable of analysis. "Space" is certainly explicable as an abstract idea, gained, like our other abstract ideas, by experience. It is a more abstract idea than extension. The idea "extension" is itself an abstract idea gained by our experience of extended things, but when we think of extension we always vaguely think of some extended body. When we speak of "space," however, we do not mentally refer to any extended body; what we really mean is the quality of extension as completely abstracted from all bodies whatever, and thought of purely by itself. "Extension" has, of course, no existence in itself, as extension; though it is real and objective as a quality of real, extended objects. Space is altogether ideal, an abstraction from abstractions, and when we speak of bodies "occupying space," we really refer to the exclusion of one extended body by another. Space, then, though there is no such *thing* as space, is a true idea, as denoting the extension of all extended things abstractedly considered. This truth does away with and explains the question which puzzles so many—the question as to whether space is or is not infinite. For we certainly do not perceive any positive necessity for an infinite series of extended bodies in the universe; and though it is true we cannot imagine a boundary to space, such impotence on our part is no matter for wonder, since we have no experience of the kind, and we cannot imagine that of which we have no experience whatever. Space cannot extend further than do extended bodies, since it is nothing but the abstract idea of their common extension and mutual exclusion.

Time.

Similarly "time" is not, and cannot be, a really existing thing in itself, nor a mere form of thought devoid of objective reality (for we are certain of our own continuous existence), nor an amalgam of feelings, for it is a distinct idea. Time, like space, is an abstraction from abstractions—an abstraction from our perception of the real successions of things which succeed one another. In the idea of "succession" some two or more succeeding things are always thought of; but when we speak of "time," we mean "succession" as completely abstracted from all

objects and events, and thought of purely by itself. "Succession" is real and objective as a quality of real, succeeding things. "Time" is altogether ideal; and when we speak of events as occurring in time, it is a mere mode of speaking, denoting the exclusion of one succeeding thing by another. For persons who believe in God, the idea of "time" may receive a derived reality from the idea of the Divine duration. Thus considered, objective "time" may be regarded as more than the abstract succession of all succeeding things, because it also implies the *duration* of the mutual exclusion of all succeeding things. Where, therefore, there is no succession, there can be no "time;" and time is no more necessarily infinite than "space" is, for it is quite conceivable that "succession" may come to an end. Duration without succession, on the other hand (which may be conceived of, but cannot be imagined, since we have no experience of an absence of succession), is seen, by any theist, to be necessarily infinite as an attribute of God. The idea of duration, may also add to our perception of the objective reality of that whence our abstract idea "space" is derived; for it brings before our minds the *duration* of the mutual exclusion of all extended things. But space, time, or duration can have no existence in themselves as space, time, or duration, save as ideas in some mind. They exist, of course, objectively as the qualities of substances whence they have been ideally abstracted, but not independently and apart from such substances.

Motion. Just as our intellectual perception and conception (or idea) of extension is called forth and sustained by those bodily experiences which have antecedently given to us (as they give to brutes) a *feeling* of extension, so other bodily feelings give to us, and brutes, a *feeling* of motion,* which feeling calls forth and sustains our intellectual conception (or idea) of motion. That idea is primary and fundamental, and can be resolved into nothing else. It is an idea conveyed to our minds both by our experiences of extended things and by our experiences of succeeding things. It is also called forth by what is immaterial as well as by what is material, since we can, so to speak, *turn* our

* As already described (see above, p. 192).

thoughts from one thing to another, and we are conscious of the passage through our minds of a series of intellectual conceptions, no less than of visions of objects seen by our bodily eyes. Thus the idea of motion is the most spontaneous and universal of our ideas. It is one of the first called forth and the most frequently brought into play. Being so universally and constantly evoked, we can readily see how it is and must be the easiest of our imaginations and conceptions, and one which the mind most readily takes to and feels most at home in, especially on account of the extreme ease with which the sustaining *feeling* of motion is called forth and experienced.* Here it is above all necessary that we should be on our guard against delusions of the imagination, and carefully distinguish between that which is evident to our intellect, and that which we are merely unable to expel from our imagination; though reflection shows that we are not, on that account, to regard it as representing objective truth. It has been objected against certain conceptions that they cannot be "mentally visualized;" but so far is this condition from being a proof of delusion, that we may rather say, whatever in these abstract studies can be "mentally visualized" is necessarily untrue, and it is often the more untrue the better it can be so "visualized."

We have abundant experience indeed of things in motion, and nothing is easier to imagine. The abstract idea "motion" also comes most readily into the mind, and at first nothing seems easier than to understand objects in movement and what we mean by their "motion." But when we come to examine into the idea, various difficulties and problems present themselves for solution. An object in motion (such as *e.g.* a feather blown by the wind) is the same thing essentially, whether in motion or at rest; and yet it is not altogether the same thing—it is in a different state. What, then, do we really mean by its "motion"? It is, of course, an abstract idea to which a certain state of some object corresponds. But when we try to think of what there may be objective in this "state," an image of an object in motion always rises before the mind. It is,

* See above, p. 193.

of course, simply impossible for us to imagine "motion" apart from some object moving, and indeed we imagine more than this without noting it. For whatever moves or has moved within our whole experience, has always done so by moving away from the place or direction of one object and towards the place or direction of another object. When we reflect upon this consideration, we see that it is impossible for anything to move except there is some other object for it to approach or recede from. Therefore motion is, or includes, whatever else it may be, a state or relation of one body towards another or others. It follows that the universe, considered as a whole, is absolutely incapable of motion save internally, because, being the universe, there can be nothing beside it to approach or recede from. But because the motion of an object cannot exist apart from the object which moves, do we see that there is nothing objective in a moving object save the object itself in a certain state? That can hardly be the opinion of those who speak of "heat" as a "mode of motion," or who believe in the transformation of "forces" or "energies." Moreover, it is often said that bodies may, by impact, communicate motion; as when one suspended ball, falling against others, ceases itself to move, while another begins to be in motion, to which latter the "motion" is said to have been transferred. The language used shows the existence of a tendency to regard "motion" as itself a substantial entity which can actually pass out of one body into another. Yet, it may be asked, if "motion" were such an entity, how could its passage between the two balls be effected? How is it to get from one into the other, and what is to make it go from one to the other? Here we seem to trench upon the confines of human knowledge. We are in a region where evidence is difficult to obtain, and where the effect of the imagination is exceedingly powerful and tyrannous.

Energy. It is impossible to think of force, energy, or motion except in material terms. We may speak sometimes of an ocean of "energy," or a whirlwind of "force," and with respect to both terms we cannot help imagining the action of solid, fluid, or aeriform substances. But our intellect

tells us that this is erroneous and misleading. It tells us that if there is anything objective corresponding to our ideas "motion" or "heat," it cannot be a form of material substance coexisting beside or within a moving or hot body, but that it must be immaterial,* and something necessarily quite unimaginable by us, however evident its actual existence may be to us. Those facts of quantitative equivalence between the different kinds of activities bodies possess, which facts have given rise to the conception of "transformations of force," do point to the existence of something objective in bodies corresponding with our ideas of "force" or "energy." The circumstance of that objective existence being by its nature necessarily quite unimaginable (being immaterial), no more affords a reason for our not believing in its existence, than does the fact of our own thinking principle being necessarily quite unimaginable afford a reason for our not believing in the existence of that principle. We have evidence, then, that there does exist in nature either one unimaginable, immaterial energy which manifests itself according to circumstances as motion, heat, light, etc., or else that there are fundamentally different forms of energy which have between them relations of quantitative equivalence as they exist and energize in the inorganic world about us. But even if the physical forces (light, heat, motion, etc.) are different embodiments of one fundamental form of energy, that does not make the forces themselves less truly and really different and inconvertible. "Motion," as experienced by us, is not an energy, but is a state of some extended body. It is a form of energy *embodied* in a certain way. So also heat, light, etc., as we know them, are also energies definitely embodied and producing effects which are states or modes of (hot or luminous) bodies. The immaterial, objective entities are, then, not "motion," "heat," "light," etc. (which are states of bodies known to us by experience), but may be distinguished as the energy of motion, the energy † of heat, the energy of light, etc. It is not, then,

* See above, p. 266.

† The word "energy" is here used for a special purpose, and not in the sense it is so often used—that is, as denoting phenomena which can be measured.

clearly evident that these various utterly unimaginable energies, which are so diverse in their effects, may not be different forms or modes of one energy variously modified by the matter and conditions of the bodies wherein they energize. But this is a very different thing from the transformations taking place between the physical forces which are, as just pointed out, embodied energies which cannot be transformed. We may call "light" or "heat" a "mode of motion," but "motion," "light," and "heat" remain absolutely distinct to all our experience and to our reason, although, as has been said, it is not evident that the immaterial energies which underlie these manifestations may not be transformed one into another. The subject will need some further treatment after we have considered the conception represented by the term "matter."

Matter.

The idea of substance—that is to say, the idea of something which endures and persists—is known to us (as we have just seen) in our perception of our own continuous intellectual being. But that is not by any means the way in which we find that idea to have been actually elicited in our own life-history and in that of other men. The mind first looks out upon the world external to it, and only subsequently reflects upon its own mental experiences and mental life; which may, indeed, never be reflected on at all. The idea of something persisting and enduring, and the abstract ideas "persistence" and "endurance," are, in fact, called forth in our minds by the various material bodies about us of which our senses take cognizance. Through these sense-perceptions, the mind directly acquires by intuition—or "intues"—intellectual perceptions of extended material bodies, and of the material substance, or "matter," of which they are, at least in part, composed. This perception is gained by our external sense-experiences, just as our perception of "force" is gained by our internal sense-experiences. But though "matter" is thus constantly and familiarly known to us as existing in material bodies, pure and simple matter, in and by itself, has never yet been revealed to us by any observations. We always perceive matter of one or another kind, and, to say the very least, no existing matter has been discovered with so few powers

and properties as to permit us to believe that in it we have before us matter of no definite kind but what is the common constituent of every material body and substance whatever.

Every material body and substance known to us is made known to us through some power, attribute, or quality which we perceive it to possess, whereby we distinguish it from other bodies. The active powers which thus pervade any material substance evidently are not other material substances existing within it, but whatever existence they have must be immaterial.*

Thus every material body or substance yet known to us would seem to consist both of something corresponding with our idea of "matter," and something immaterial—some energy existing with the matter, whereby that body or substance comes to exercise those active powers which make it known to us as being whatever kind of body or substance it may happen to be. Not only, then, is there no "space," but only extended bodies; no "time," but only succeeding events; and not only are "those objective entities which correspond with the forces of bodies considered in themselves," unimaginable, immaterial existences which we distinguish as multitudinous energies or a multiform energy, but also there is no such thing known to us as "matter" in and by itself. We know only concrete material bodies, every one of which is of a definite peculiar kind, possessing its own definite immaterial activities. So far as physical science has yet advanced, it finds every substance to be either an element or resolvable ultimately into certain definite elements, and every elementary substance has its own special and characteristic active powers.† Therefore every material, inorganic body, and substance known to us, we have so far reason to regard as consisting of matter together with an immaterial constituent, the latter being the active, directing, dominant principle of the material substance; which thus consists of a material and an immaterial existence, neither of which is perceptible to the senses or picturable to the imagination, though both

* See above, p. 266.

† The allotropic and isomeric states of the same and different substances are here taken into account.

can be conceived of by the active human intellect. We must not venture, however, dogmatically to affirm it to be evident that pure matter, the common constituent of all material things, can never at any future time be obtained. The present writer does not think that it will, and is inclined to believe not only that pure matter will never be obtained, but also that its actual nature, together with the real ultimate constitution of all material substances, will for ever remain inscrutable to our present faculties. Should, however, such pure material substance be ever discovered, it is evident that it must be discovered by our sense-perceptions, and therefore must possess certain characters whereby we can apprehend it to be what (on the hypothesis of its existence) it is. It then must have its own active powers, and there will, therefore, be the same reason with respect to it, as with respect to multitudinous elements, to regard it as a substance of twofold nature—as having its material and immaterial sides or principles, whereof the latter is the dominant one. Up to the present time, however, physical science brings before our observation no pure matter, but only a countless multitude of bodies of most varied kinds, each consisting of either one kind of substance (*e.g.* gold and diamond), or of two, several, or many substances variously combined together.

Similarly, the active powers of bodies as we experience them do (as common sense assures us) also exist. We have the plainest evidence of their calorific, luminous, chemical, and motor activities. As we have seen, it is not evident that these activities may not be divers forms of one unimaginable energy, but it is still less evident that they are so.

Phrases denoting a transformation of energies have, not unnaturally, come into fashion as a consequence of the recognition of that quantitative equivalence between the various physical activities of inorganic bodies which can be most conveniently expressed in that fashion. But though it is thus convenient to express such changes (especially experimental changes accurately measured) in terms of a persistent energy, yet the physical phenomena are capable of expression as different bodies endowed with

various active powers. The conception of the same and different bodies being successively affected, and acting successively in different, definite manners (with a quantitative equivalence between the modes of their affection and activity), is a conception as consonant with the facts presented by a working steam-engine, an electrical machine, or a galvanic battery inducing chemical changes, as is the conception of one energy variously transformed.

Motion and thought.

A short time back it was stated * that the idea of motion is called forth in us by the play of our thoughts, as well as by the movements of material, extended objects. The assertion is true, but needs to be guarded by some further explanation. As has been said again and again, our imagination is tied down to our sensuous faculties. We can imagine nothing of which we have not had some sensuous experience, and we can conceive of nothing save by the aid of the imagination, of which our intellect has to avail itself as of a crutch, being careful to advert to the fact that its crutch is a crutch and nothing more. Our intellect, in recognizing the movements of thought, perceives their succession, but it cannot have the idea "succession" without the aid of the imagination of succeeding material things, and material things cannot succeed except by motion. Succession—and therefore force and energy, which occasion or result in succession—are seen, on reflection by the intellect, not necessarily to involve anything material and extended. But "motion" is seen necessarily to involve bodies which are material and extended. "Motion," therefore, is here suggested to us (by our intellectual experiences of succession) not directly by the intellect itself, for succession does not (as we have just seen) necessarily imply "motion." "Motion" is suggested to us by our "imagination," as without the help of that faculty we cannot think at all, and we cannot think of motion save by the aid of mental images of moving things. Thus, though the idea of "motion" may be suggested by a consideration of the mental succession of succeeding thoughts, nevertheless it is not called forth by the succession of the thoughts themselves, but by the sensuous sub-

* See above, pp. 410, 411.

stratum of imagination, without which we cannot consider that mental succession. But in the movement of thought, as in the movement of billiard-balls, there is true "succession;" and this element, common to both, is the basis of a certain true analogy which exists between mental and material activities. It is this analogy which justifies such expressions as "movement of thought," "turns of thought," "progress of mind," etc. "Force" or "energy" can be conceived of as so existing both in material bodies and also immaterially in any immaterial substance of the existence of which we may have evidence. But neither force nor energy can be conceived of as existing, except as existing in something, although this something need not be material and extended. "Motion," however, cannot be conceived of (let the reader try if it can) as existing except in something material, and needs to be sustained and accompanied by the feelings and ideas of both extension and succession.

Moreover, as before said, when we reflect on the motion of bodies we see that our idea of such motion is a purely abstract idea, and that the motion of any moving body cannot exist objectively save as a state of the body which moves. The idea is obtained by imagining a moving body, and then ideally, or subjectively, separating its movement from itself, which is, of course, objectively impossible. But, as we have seen, the phenomena of nature seem clearly to indicate to our minds, the existence of something utterly unimaginable in a moving body besides the body itself, which utterly unimaginable existence we have distinguished as "the energy of motion."

The inorganic world.

The inorganic world about us, then, as seen, thus far, in the light of science, agrees with its aspect as regarded by common sense. The unsophisticated mind regards the inanimate universe as consisting of a number of separate substances, each being a substance of some definite kind possessing certain powers and properties. If the common-sense man is asked whether each body is an actual, material substance, he will reply, "Of course it is." If he is asked what gives it its special powers and properties, he will answer he does not know, and he may not improbably add that he does not believe that any one else knows either.

Science also shows us a world consisting of a number of separate, inorganic substances, each being a substance of some definite kind with special powers and properties. It also tells us that each is an actual, material substance, informed by an immaterial energy which is utterly unimaginable and inscrutable in its nature. Each material object is thus regarded as a unity having its material and its immaterial side—a "*compositum*" of matter and of some form of energy, the latter principle giving the substance those powers and properties which make it what it is.

The immaterial principles of these multitudinous substances may be absolutely and eternally different in nature, but it is not evident that they may not be the results of the interaction of different aggregations of one primitive matter informed by one primitive immaterial principle. If so, however, we must be on our guard against allowing our intellect to be so enslaved by our imagination as to regard the multitudinous immaterial principles, thus resulting from such interactions, as so many separate "parts" of some "ocean of energy," parts substantially like the ocean whence they were derived. The image of an "ocean" is, of course, an utterly misleading image. The primitive energy and the multitudinous resulting energies are all alike necessarily unimaginable. Whatever their process of production, however brief their duration, and however complete their possible lapse into other forms and their return to their condition of primitive energy may be, every one of them, while it energizes, must be regarded as actually distinct and substantial, so long as the substance it informs continues to exist as a distinct kind of substance. Therefore, once more, there can be no such thing as a transformation of physical force, or of any embodied energies. The physical forces, though possessing a quantitative equivalence, and alternately appearing and disappearing, are each only that which we know them to be, though the inscrutable, unimaginable entity underlying each of them may or may not be the same as that which underlies the others. Diverse manifestations, as before said,* of one energy may possibly take place, but not of any force which

* See above, p. 413.

makes itself evident to our senses by the actions of the various bodies which we experience as hot, or luminous, or in motion, or what not. There are yet other conceptions which cannot be put aside as evidently false ones. One is the conception of the material, inorganic universe, as consisting only of different aggregations of one matter with intrinsic motion. Another conception is that the inorganic universe may consist of an unimaginable substance which is neither extended matter nor what we conceive of as force. Matter *per se* is unimaginable, and so is force *per se;* the universe may therefore, it is urged, consist ultimately of something which is neither one nor the other, but which is a unity whereof extension and force are attributes.

These conceptions do not by any means commend themselves to the mind of the present writer, but we must be most careful to avoid all narrow dogmatism, and not to declare anything to be certainly false, however apparently improbable, which is not necessarily and evidently untrue, on account of the necessary and evident positive truth of something which contradicts it.

As yet, in this chapter, we have, besides our own nature, only taken the inorganic world into account. The above speculative conceptions may be more fruitfully considered when the whole cosmos has been surveyed.

If we may not even then be able to affirm with certainty what is the very truth as to the constitution of nature, we shall, at any rate, be in a better position to examine as to which hypothesis best accords with and explains the whole of nature, organic and inorganic, living and dead.

The organic world.

Glancing back over the world of organic life, which we have endeavoured to convey a general notion of in the preceding section of this work,* we see a vast multitude of living creatures most diverse in their forms, and having very different faculties, yet all agreeing in the possession of certain powers and a certain fundamental unity in structure. The lowest of these organisms, consisting of simple cells with slightly differentiated contents, have the powers of merely vegetative life only, whilst all undoubted animals

* See chs. xxi. to xxiv.

share with us a faculty of sensation, and the highest (because most like us bodily), the apes, closely resemble us in their sensitive, emotive, and imaginative faculties.

We have recognized that our own nature possesses * both distinctly intellectual faculties and also sensitive powers which can act apart from our intellect. Study and observation serve further to convince us that we have a number of vital powers—organic memory, organic response, etc.—by which a multitudinous series of merely organic actions are performed without sensation, and that others (as in the early embryo) are carried on without even the presiding influence of a nervous system. Finally, we have noted that actions and reactions take place in our being such as take place in the merely inorganic world devoid of life. Such actions are the merely mechanical actions of the joints of the skeleton, the influence of gravity, and various chemical changes—though these, like all the other actions of our being, take place under the presiding influence of that immanent, immaterial entity, our soul, which dominates and unifies all the various activities of our being. When, having been thus informed by reflection, we turn our gaze from ourselves upon the world around us, we recognize the existence of a multitude of bodies which seem to share, in very different degrees, those powers and properties of our own nature. Common sense now suffices to assure us that there must be in animals (which resemble us in so many of our powers) a certain resemblance likewise in the source of those powers. We have seen that we are each of us a dual unity, and that the dominant and directive side of our being is an immaterial principle (which together with the matter of the body forms absolutely one thing) we have called the soul. Common sense, then, also suffices to assure us that every living creature must be also a two-sided unity, with an immaterial principle as the formative, sustaining, dominant aspect of its one being. Who can doubt but that a tiger has the power, as before said,† to exercise all its five senses simultaneously while in the act of tearing its living prey? More than this; such sensations call up in it more or less distinct reminiscences of similar

* See above, p. 203. † See above, p. 354.

feelings and emotions previously experienced, and these will occasion fit and suitable actions, so that past and present sensations, of very varied kinds, are united with various emotions and appropriate actions in one psychical activity. Such a tiger would seem then also to be the seat of a unifying power, uniting and synthesising its various activities, and acting as a principle of individuation. Such a principle must, however, altogether escape, as does our own soul, the cognizance of the senses, though reflective reason and common sense may combine to assure us that it is by it that an animal concentrates into one mental centre the multitude of impressions made simultaneously and successively on its organs of sense. For what common sense affirms is that each living organism can move itself; in other words, that it is, by its own essence, a centre of immanent activity or internal force. We cannot get rid of the perception that there must be such a thing as internal force. To conceive of the universe as consisting of atoms acted on by external forces, but having in themselves no power of response to such actions, is a manifest absurdity. No one thing can possibly act upon any other unless that other has an innate capacity to be acted on. As to living organisms, we may analyze the activities of any animal or plant, and, by consideration of such activities separately, find resemblances between them and mere physical forces, as we have above pointed out. But the *synthesis* of such forces as we find in a living creature, is certainly nowhere to be met with in the inorganic world. To deny this would be to deny the plainest evidence of our senses. The presence of a special internal force is perhaps most evident in that wonderful process of development which each organism goes through,* especially in its earlier stages, after the fertilization of the germ. This view, at once popular and philosophic, has of late years received a remarkable adhesion from a writer who at one time was amongst the foremost advocates of a mechanical conception of nature. We refer to the German philosopher, Hermann Lotze, before mentioned—a man quite free from theological or other prejudices and prepossessions. Influenced only by a profound

* See above, p. 339.

and patient exercise of his reason, he has come to enunciate,* in the most uncompromising way, the existence in each animal of a soul, or "psyche"—an entity which, though clearly to be perceived by our reason, is, he tells us, as impossible to imagine as it is to imagine "how things look in the dark." Thus every animal is a unity with its material and its immaterial side. We find in each organism a chain of physical changes accompanied by a chain of immaterial energies, some part of which we know in ourselves in consciousness and sensation,† but the rest of which in ourselves and in all other living creatures we can only know by rational inference. The chain of physical phenomena consists of the actions of that side of the one living whole which we call its visible body. The chain of immaterial energies consists of that side of the one living whole which is the principle of individuation, psyche, or soul. The more complex the structure of an animal, the more multifold are its functions and the more elaborate is the process of unification.

But the principle of individuation is itself not only one and indivisible, but (as before said) forms with the material body one indivisible unity. It and the body are one, as the impress on stamped wax and the wax itself are one, though we can ideally distinguish between the two. It is not an extra-organic force within the body, yet numerically distinct from it, and acting by and through it; but it is an intra-organic force, making, with the matter of the body, one real, substantial, and individual whole. There is one living unity which may be considered either *dynamically* when we consider its principle of individuation, or *statically* when we regard the parts and matter of the body. We have seen ‡ that structure and function vary together, as the convexities and concavities of the same curved line do and must vary together. Similarly the dynamic principle and the structure it informs must disappear together, unless some special character leads us to consider any such principle to be exceptional in its nature, and the soul of man (as possessing intellect and free-will) is most exceptional.

* In his "Microcosmus." A translation was published by T. and T. Clark of Edinburgh in 1885.

† See above, p. 266. ‡ See above, p. 331.

This principle of individuation, psyche, or soul animates the whole body, which is its "organ," and the function of such an organ (the whole body) is the "soul's action," or "life" of the organism. Not to accept this is to be driven to the absurdity of conceiving the living body, not as a unity, but as made up of an indefinite quantity of minute independent organisms, each having its own principle of individuation,* its own soul.

This conception only multiplies difficulties, since the same arguments can be brought against the existence of each of these souls as against the one soul, while to affirm their existence and to deny functional unity—to deny that a living organism (or our own living self) is each respectively one thing—is to contradict the direct evidence of our senses as regards other organisms, and of our consciousness itself as regards our own being, since our own perceptions tell us that we each are one whole being, a living unity in multiplicity.

Animal automatism

But some writers, as we earlier pointed out,† who fully recognize the fact of the two coexisting cycles of change in each animal (the physical and the immaterial), have regarded the latter (the immaterial) as the mere effect of the former (the physical), and have denied to the feelings of animals, or to the thoughts of men, any power to act as causes on the events of life, both animals and men being regarded as mere automata. But the notion that an animal is *really* a machine is an absurdity, for a machine is a complex structure the actions of which are fully to be accounted for by the physical properties of its component parts and the action of merely physical forces, without the intervention of sensation, or of any of the influences like those which induce nutrition and reproduction in living creatures. A clock, to be really comparable with an animal, must be capable of winding itself up, gathering oil to replace that which is consumed in its movements, repairing any trifling injuries which may result from the friction of its wheels, and, finally, of giving forth from time to time miniature reproductions of itself, destined ultimately to attain the size of the parent timepiece.

* As has been affirmed by Professor Haeckel.

† See above, p. 265.

Now, an animal—as, for example, a dog—is, as we have seen, a complex structure which has all its powers and parts so mutually adjusted as to serve one another, that it may be said to be a mechanism, the parts of which are reciprocally ends and means. But though its actions, like those of a machine, mechanically and necessarily follow the adjustments of its various parts, yet its actions do not take place without sensations which are not the *mere accompaniments* of bodily actions, but are themselves guides and directing agencies which intervene and operate upon, though they do not break through, the circle of its bodily actions. The feeling of the blow of a stick, or the sight of a threatened blow, will change the course of action which a dog would otherwise have pursued. That it is the "feeling" or the "sight" of the stick, together with the various past feelings and imaginations which such fresh experience calls up, which causes the change, will be disputed by no one who has not some eccentric thesis to maintain. But the movements of the animal are also determined (as we have seen * our own movements to be) by a multitude of organic influences which are not felt, and form part of the immaterial chain of activities which accompanies the chain of physical modifications which take place during its life. Thus the animal is a creature of activities which are partly physical and material, partly psychical and immaterial, of which the latter—both the felt and the unfelt—are directive, though they are in turn influenced by physical modifications.

The notion that an animal is a mere automaton in which physical actions alone enter into the chain of causation, has been supported by comparing its psychical activities to mere collateral products of the working of a machine, such as the sound of the steam-engine's whistle. Against this Mr. Lewes has urged † as follows:—"The feeling which accompanies or follows a particular movement cannot, indeed, modify *that* movement, since that is already set a-going, or has passed; but the analogy fails in the subsequent history. No movements whatever of the steam-engine are modified by the whistle which accom-

* See p. 266. † See his "Physical Basis of Mind," p. 407.

panies the working of that engine; yet how the reflected impulse modifies the working of the organism! If the hand be passing over a surface, there is, accompanying this movement, a succession of muscular and tactile feelings which may be said to be collateral products. But the feeling which *accompanies* one muscular contraction *is itself the stimulus* of the next contraction; if anywhere during the passage the hand comes upon a part of that surface which is wet or rough, the change in feeling thus produced, although a collateral product of the movement, instantly changes the direction of the hand, suspends or alters its course—that is to say, the *collateral product of one movement becomes a directing factor in the succeeding movement.*" This is what no automaton could effect. Sensation is of the essence of the process, and is evidently a "cause." What our own consciousness tells us about the operation of our own thoughts and will on physical events, we have already seen,* and the bearing of this knowledge upon the question of animal automatism is evident. But the principle of individuation of a dog, like that of man, governs the lower merely organic processes of life as well as energizes in the highest it is capable of. It constantly acts, as does his, † with animal intelligence in some actions, with sentience in many actions, but constantly in an unperceived and unfelt manner.

What an organism is.

An organism, then, may be conceived of as being the visible expression and manifestation of an immanent principle—an immaterial reality, the psyche, or soul. Thus understood, it must be the soul which makes the living organism what it is, though it has no actual existence apart from the matter it vivifies. Its action includes every vital action of the organism, and especially those activities of development and instinct ‡ which constitute the physiology of the individual. As the German philosopher, Wundt—though no believer in God—tells us, "the psychical life is not a product of the bodily organism, but the bodily organism is rather a psychical creation in all that, by its purposive power of self-regulation, gives it precedence over inorganic bodies." We say "organism," and not "animal,"

* See above, pp. 264–268. † See above, p. 390. ‡ See above, pp. 358–365.

because a principle of individuation, or "psyche," must, we think, be admitted to exist in plants if it exists in animals. In every plant there are innate harmonious growth, sustentation, and reproduction, while in some, such as *Dionæa*,* *Drosera*,† and *Linaria* ‡ we meet with a susceptibility to impressions, followed by appropriate actions which strangely simulate the actions of animals, and the actions of roots and tendrils § are very noteworthy. If we grant a principle of individuation to animals, we cannot refuse one to such plants; if not to such plants, then not to others generally like them, and so on. The action of the soul, or psyche, includes every action of the organism, whether plant or animal, of which it is the immaterial constituent, and each action of the kind is a "psychosis" ‖ of one kind or another—there being, of course, vegetal and animal psychoses. The science of psychoses must, of course, be termed "psychology." That term has, however, unfortunately been applied to the study of mental phenomena exclusively. It should certainly include not only such phenomena, but also all those activities of an organism, considered as one whole, which we have said ¶ form a section of study which may be distinguished as the "physiology of the individual." One most important department of such psychology is the study of instinct.** Instinct has been defined as a "special internal impulse, urging animals to the performance of certain actions which are useful to them or to their kind, but the use of which they do not themselves perceive, and their performance of which is a necessary consequence of their being placed in certain circumstances." It is hardly necessary to point out that the existence of such a power in nature is absolutely fatal to a merely mechanical conception of the universe, and thus the phenomena of instinct are, as Schelling long ago declared, amongst the most important of all phenomena, as tests of a true philosophy. We have seen †† that this faculty must be allowed to have a real existence and a dis-

Psychology and physiology.

* See above, p. 321.
† See above, p. 332.
‡ See above, p. 333.
§ See above, p. 335.
‖ See "The Cat," p. 386 (John Murray: 1881).
¶ See above, p. 365.
** See above, ch. xiii. p. 175, and ch. xxiii. p. 361.
†† See above, chs. xiii. and xxiii.

tinct nature, provided we do not find (in our last chapter) that a system of evolution is able to explain it away. Assuming for the moment that it cannot be explained away, it is a faculty which harmonizes perfectly with, and is explicable by, the existence in each animal of a distinct, immanent principle of individuation such as we have endeavoured to describe. Certain special anatomical and pathological facts, well worthy of note, seem to afford us yet further evidence for the existence in each animal of such an internal, immanent, and immaterial principle.

Organic symmetry.

We have already seen * that there is a marked serial homology between the arms and legs and the hands and feet of man. But much more curious instances of homology are found amongst various other vertebrates. Thus, in the slow lemur (*Nycticebus*) and the potto (*Perodicticus*) † we find instances of exceptional serial homology. In the potto there is an extra bone in the ligament which encloses the tendons which bend the fingers, and a similar structure is also developed in the animal's foot. In the slow lemur we have an exceptional arrangement of the muscles and tendons of the hand, and we also find a very similar arrangement in those of the foot. ‡

In the tortoise (*Chelydra*) the fore and hind limbs assume a marvellous similarity, which is carried still further in the mud-fish (*Ceratodus*) § and in those great extinct marine reptiles, the *Plesiosauri*.‖ But perhaps the most curious and instructive instances are those in which the feet of trumpeter pigeons and bantam fowls are unusually feathered, or, as it is termed, furnished with "boots." These extra feathers are developed along the very parts of the foot which correspond (*i.e.* are serially homologous with) those parts of the bird's hand which bear the wing-feathers, so that these boots are plainly a serial repetition of the true wing-feathers. These foot-feathers have, indeed, been sometimes known to exceed the wing-feathers in length. Moreover, these foot-feathers resemble the true wing-feathers in structure, and are quite unlike the down which ordinarily

* See above, p. 152.
† See above, p. 317.
‡ See "Proc. Zool. Soc.," 1865, p. 255.
§ See above, p. 317.
‖ See above, p. 318.

clothes the legs of such birds as grouse or owls. But there is a more striking correspondence still, for in pigeons which are thus "booted" the two outer-digits (toes) become more or less connected by skin, as are also the digits of the pigeon's hand.

We have already spoken * of certain instances of this tendency to serial similarity in abnormal human structures. Professor Burt Wilder has recorded † no less than twenty-four cases wherein abnormalities coexisted in both little fingers; six in which both little fingers and little toes were similarly affected; and twenty-two cases more or less the same, but in which the details were not accurately to be obtained. M. Isidore Geoffroy St. Hilaire has remarked ‡ concerning monstrosities, "L'anomalie se répète d'un membre thoracique au membre abdominal du même côté," and quotes a case in which certain corresponding parts of each division of the hand and foot were simultaneously absent. Sir James Paget, in treating § of symmetrical diseases, mentions a lion's pelvis which was marked, through a sort of rheumatic affection, by a pattern more complex and irregular than the spots upon a map, yet so symmetrically disposed that all spots or lines on one side of the pelvis were exactly repeated by those on the other side. He also observes that diseases very often affect simultaneously such homologous parts as the backs of the hands and feet, the palms of the hands and soles of the feet, the elbows and knees, and the corresponding parts of the upper arms and thighs. Very marvellous is the radial symmetry displayed by many echinoderms ‖ in the arrangements of the singularly complex variety of their component parts; but most admirable of all, perhaps, is the extreme complexity and beauty of the marvellously symmetrical siliceous skeletons of many *Radiolaria*,¶ especially of the kinds known as *Acanthometra* and *Dorataspis*. Facts such as those here briefly related, seem to make evident the existence in each such animal, which as a whole is a visible

* See above, p. 153.
† *Massachusetts Medical Society*, vol. ii. No. 3, June 2, 1868.
‡ "Histoire Générale des Anomalies," tome i. p. 228. Bruxelles: 1837.
§ "Lectures on Surgical Pathology," 1853, vol. i. p. 18.
‖ See above, p. 319. ¶ See above, p. 320.

unity, of an innate force tending to carry out development in a definitely symmetrical manner, but liable to have its effects modified by the action of surrounding circumstances. That such circumstances do often operate in a very marked manner we saw in the concluding portion of the last chapter of the last section of this work.

As has been before remarked,* the objection of physiologists to the notion of a "soul" in man, has been due to the mistaken way in which its existence has been asserted —a way which justified and even necessitated objections and denials. Physiologists had very good reason for denying the existence, even in man, of an immaterial principle numerically distinct from the living body, and *à fortiori* they had and have very good reason for denying the existence of any such distinct entity in lower organisms. The conception here advocated, however—that of an immaterial principle and a material substance, as much "one thing" as "heat" and "iron" in a red-hot poker are one thing—is open to no such objection Every form of energy is absolutely and necessarily unimaginable by us save in terms of extended bodies—fluid, gaseous, or what not—or of our own activities as revealed in reflex consciousness; and therefore the individuating, immaterial psyche of each creature must be absolutely unimaginable. But we may be none the less sure of its existence; as we are sure of the existence of heat, though we can never imagine it —except as a quality of some extended body or of our own sensitive faculty. We are quite sure that there really is such a thing as the objective energy "heat," whatever that unimaginable entity may really be.

Vitalism. There is another objection, however, which may possibly be urged against the view here advocated—the objection, namely, that it only amounts to a reassertion of the now discarded hypothesis already spoken of as vitalism.† That hypothesis has been abandoned, partly on account of the impossibility of demonstrating the existence of such a "force," and partly on account of the small utility of the hypothesis in scientific investigations. The wonderful physiological discoveries which modern research has made,

* See above, p. 390. † See above, p. 393.

have been made, not by investigating the ebb and flow of an imaginary "vital force," but by the application of the ascertained laws of chemistry and physics to the study of living nature. No doubt the true philosophical conception of what a living organism really is, will hereafter prove of practical utility, especially in the treatment of mental disease; but the conception of a "vital force" cannot serve this purpose.

The connection between the actions of organisms and the forces of their environment is most intimate. Living beings are notoriously affected by and react upon the physical forces of nature, and are far indeed from being isolated; for the life of each largely consists of an interplay between what we consider its own body and environing nature. So intimate is the connection between each of us and his environment, that it is even difficult to determine, in minute detail, the line of separation between the two. Food, some time after being swallowed, is not yet the "tissue." When digested and entering the absorbents which convey it to the blood-vessels destined to carry it to the tissues for diffusion in the ultimate parenchyma of the body, who can say exactly how soon this foreign body becomes the living being, or precisely when and where it is transformed into our very substance? It is the same with the streams of air carrying inwards the life-sustaining oxygen and outwards the deleterious vapours. By such agencies the outer world blends with us and we with it. Far from finding any such indubitable evidence of the existence of a "vital force," as we have of those phenomena we speak of as "heat," "motion," and "light," each living organism, thus viewed purely from the standpoint of physical science, seems, in the words of the German philosopher Lotze, only as a place where the matter and the energies of nature meet in relations favourable for the production of vital phenomena. Yet the phenomena of the focus are not explained by any peculiar force common to all foci—a "focal force" comparable with the supposed "vital force"—but are scientifically accounted for by light and the agencies and media of different densities through which it is said to be transmitted. The life of an organism may

be compared (at least, from the physical science point of view) to the quiet light of a wax candle, which seems to the uninstructed observer to be the simple action of what he calls "fire" and nothing else, while to the man of physical science it is a most complicated series of changes, chemical and physical—oxygenation, decomposition, the formation of water, capillary attraction, etc., all of which must be taken together to explain by their diverse simultaneous activities, an effect which has not only an apparent but a practically real unity, as we see every day from its action and effects. Fire has, from time immemorial, been taken as a symbol for life, and the multiplication of its manifestations (as when many candles are lit from one) is an apt symbol of the process of generation. The separate flames are not manifestations of one universally diffused force, but are separate entities temporarily existing, possessing a certain unity, and energizing with very marked effects. Similarly, the conception of the existence in every living organism of an active principle of individuation is utterly different from "vitalism." It postulates no diffused "vital force," but affirms the calling forth into active existence of separate and substantial (though but temporarily existing) entities, each of which has an actual separate existence of its own, in and with the material body it forms, informs, and sustains. Indeed, common sense combines with philosophy to assure us that a living animal is not a mere complex piece of matter played upon either by physical forces from without, which transform themselves in passing through it, or by a diffused vital force. A living organism is regarded by the unsophisticated mind as the manifestation of a peculiar, immanent, immaterial principle which for a time manifests its existence by the activities of the body with which it is entirely one. It may, indeed, be much more truly said "to be" the living organism, than the lump of matter of which it is also composed can be said "to be" that organism. As before observed, this principle can, of course, no more be imagined than we can imagine the energy of motion, the energy of light, or the energy of heat. Yet reason tells us that all these do and must exist. The fact that physical science cannot

possibly show us such a "principle of individuation" is no argument against its existence. We saw in the very first section of this work that our intellect reveals to us absolute, necessary, and universal truths. Such truths underlie all physical science, and we must once more remind the reader that philosophy is the judge of physical science; that "thought," and not "imagination," is our supreme and ultimate criterion; and that many things can be conceived of which can never be imagined, but only symbolically expressed by words or other external signs. The poverty of our imagination, then, should constitute no bar to our acceptance of a truth which is verified for us by our reason—and such a truth is the existence, the necessary existence, of some principle of individuation in every organism which lives to go through that cycle of definite changes which it has somehow been conditioned to go through. This conception is, moreover, facilitated by the reflection that we may (as we have seen) regard even each inorganic kind of material substance as a composition of matter and energy.

Five orders of immaterial principles.

Amongst creatures which make up the world and its inhabitants, we see, in the first place, a multitude of human beings substantially like ourselves. Secondly, we recognize a world of animals which, according to their kind, share in our various psychical powers except those higher faculties * which pertain to intellect. Next, we observe a whole world of plants, the members of which give us no evidence of any faculty of sensitivity,† but seem only to have active powers which answer to those organic faculties of ours which operate without sensation. Lastly, we observe an inorganic world of lifeless nature, every substance and body of which is full indeed of active powers and capacities,‡ but yet altogether different in their nature from the active powers and capacities of living things. Now, we have seen that the active immaterial side, individuating principle, or psyche, of each living organism is the dominant and directing side which constitutes it, *par excellence*, that which it is. The immaterial agency, then, of each of all these creatures of such different grades of

* See above, p. 223. † See above, p. 334. ‡ See above, pp. 301-309.

being and such diverse powers must be just as different. There must be, therefore, different grades and orders of immaterial unifying principles, corresponding with the different grades of power and activity manifested. There must be an order of intellectual principles such as we find exemplified in man. There must be an order of merely sensitive principles such as we find exemplified in animals. There must be an order of merely vegetative, organic principles such as we find exemplified in plants; and there must be orders of merely physical, active principles, organic and inorganic, such as we find respectively exemplified in the many kinds of bodies which constitute the non-living world. But the greatest difference between these five orders of principles of individuation is the difference between the merely animal and the rational soul. For, as we have seen, man is able not only to reflect on his own being, and on the phenomena, substances, and causes about him, but also to apprehend universal and necessary truth, and to intervene by his free-will in the otherwise strictly necessary chain of physical causation. He thus differs from all the rest of the visible universe by a distinction so profound, that none of those which separate other visible beings is comparable with it. The gulf which lies between his being as a whole and that of the highest brute, marks off vastly more than a mere kingdom of material beings; and man, so considered, differs far more from an elephant or a gorilla, than do these from the dust of the earth on which they tread. We have, of course, no experience of a human soul without the body, and therefore it is utterly impossible to imagine in any adequate or accurate way that distinction between the soul of a brute and the soul of man which our reason assures us exists. Nevertheless, we may form a practically useful image as follows: The soul of a brute may be imagined as a subtle force entirely immersed in matter, and conterminous with the body, while the soul of man may be imagined as a, in many respects, similar force, which is (although strictly amalgamated with all the matter of the body, so that the body and it form one unity) not entirely immersed in matter, but exceeding the matter it informs. Thus we may imagine the

soul of man as acting on, and being affected by, the material body (as is the soul of a brute); but, in virtue of its excess, as acting on and directing that body in ways and degrees which the soul of the mere animal cannot compass. Of course, this comparison is a mere makeshift, and necessarily inaccurate, because the soul is immaterial, and we cannot imagine anything immaterial. Still, in the absence of something better, it may bring home to our minds, to a serviceable extent, a condition of existence easily conceivable, though necessarily unimaginable. The real difference of nature which exists between man's soul and that of every other organism is, however, in no way dependent on the mere imagination, but is made clear and indisputable by those considerations of our self-conscious knowledge of our own continuous being and our power of free-will. This difference of nature warrants a belief in a corresponding difference as to duration and destiny, and affords grounds for believing that that simple, substantial, immaterial energy—the human soul—may survive the destruction of the body, and not, like the soul of a brute, necessarily disappear with the dissolution of that material organism with which during life it is, both in man and brute, so intimately united that body and soul form but a single entity.

The foregoing considerations may be shortly summarized as follows :—

We have seen that every individual organism, and every organic substance, seems to be a unity made up of two separately imperceptible and unimaginable entities—(1) extended matter, and (2) an immaterial principle of energy.

The immaterial principles of all bodies known to us may be grouped in five categories :

1. Principles of substances inapt for life, each of which so informs a portion of matter as to constitute one kind of inorganic substance, but no "individual."

2. Principles of substances apt for life, each of which so informs a portion of matter as to constitute it one kind of organic substance, but no "individual."

3. Principles of individuation pertaining to insentient organisms—vegetal principles—each of which so informs a

portion of organic and inorganic substance as to constitute an "individual" organism, which may or may not be physically separate.

4. Principles of individuation pertaining to sentient organisms—animal principles—each of which so informs a portion of organic substance as to constitute an almost always physically separate "individual" organism.

5. Principles of individuation pertaining to rational organisms—rational principles—each of which so informs a portion of organic, animal substance as to constitute an individual human being or "person."

Between the objects to be classed in each of these five categories there is a more or less considerable break at present existing. In spite of the advance of organic chemistry, there is still a marked interval between all inorganic matter and that of the tissues of bodies recently deprived of life. Between living and non-living bodies a wide gulf now exists, which no efforts have succeeded in bridging over,* or seem likely to be able to bridge over without a large accession to our knowledge. Between sentient and insentient living organisms the break is inconspicuous, but reason shows that such an interval† does and must exist. Between man and all other creatures known to us,‡ organic or inorganic, there is an enormous interval, the existence of which is shown by the existence in man of free-will and of that active intellect made evident to our senses and reason by language embodying abstract thought.

Generation. Each individuating principle in each case must be one with the body it informs, and therefore, as the active, dominant, and directive aspect of the organism, it must be present in the freshly fertilized ovum or ovule, and act in and direct all those processes by which the body is built up, and which, therefore, it, in a sense, may be said to create.§ Its activity constructs all the organs and initiates all the functions of the body. In the plant it creates living matter from the inorganic world, and in the animal it transmutes food into the substance of its own living body. It informs each organism when in the condition of a simple cell as well

* See above, p. 330.
† See above, p. 336.
‡ See above, pp. 346–357.
§ See above, p. 326.

as in later life, when its relatively large and much differentiated but still continous body, may be said to constitute an enormous and very complex cell.* When any organism has produced a portion of its substance, apt to serve as the starting-point of a new individual, a new principle, or psyche, may be conceived of as being at the very same time originated within it. It is not thus the parental principle which has been divided (for how can we regard what is immaterial and unextended as divisible?), but a new one which has been produced.† The same thing occurs in spontaneous fission and in processes of budding which end in the detachment of the buds. Also in cases such as that of the hydra,‡ where an animal can be artificially divided and each half will become a perfect creature, like the whole from which it was cut off; and in cases like the reproductive stage of various lowly organisms, where its whole contents § will break up into a swarm of spores or other germinal forms—*in* each and *all* these cases, every naturally or artificially separated portion which possesses this power of development, and every spore of a swarm, gains in the instant of its separation, if not just before, its own separate psyche.

Intermediate temporary forms.

But, as we before saw, portions may be removed from a living creature which for a time show various signs of life. A lizard's tail broken off ‖ will move vigorously; a frog's hind legs ¶ will long respond by vital actions to appropriate stimuli; the heart ** taken from the body will for a time continue its rhythmical contractions; and a whole body, dead beyond all hope of resuscitation, slowly loses its vital energies, which persist much longer in certain tissues and organs than in others.†† We may take, in connection with these phenomena, various imperfect attempts at generation, such as the laying by fowls of eggs which have not been impregnated, the formation of acephalous fœtuses, and other such abortive reproductive products as are necessarily unable, from their own defects, to carry on the normal processes of individual development.

* See above, p. 151. † This process will be further noticed in ch. xxvii.
‡ See above, p. 337. § See above, p. 339. ‖ See above, p. 337.
¶ *Loc. cit.* ** *Loc. cit.* †† *Loc. cit.*

Now, we have seen there are immaterial principles, or, as it were, concentrated forms of energy, of very different orders. We have those which manifest themselves in the gravitative, cohesive, and capillary properties of bodies, as well as those which show themselves in light, heat, chemical action, electricity, magnetism, and motion; we have those which show themselves in the concentrated energies, or psyches, of living organisms, and which principles may be merely vegetative, or animal, or rational. It is readily conceivable, therefore, that there may be intermediate orders and degrees of concentrated energy which manifest themselves in organic matter, too imperfectly formed for normal life—that is, for the telic * series of cyclical changes which are characteristic of all duly organized living bodies. Such forms of energy may be perceived in the action of those parts or tissues of organisms which maintain a certain kind of vitality after the organisms themselves are dead past hope of resuscitation. Such forms, again, are active in temporarily living, imperfect, reproductive products; and, lastly, also in those portions of organisms separated artificially, and for a time manifesting activities akin to those normally performed by them when unsevered. Here, then, the artificial division of an organism does not generate fresh individuating principles like those of the organism yet unsevered, as we saw to be the case in spontaneous fission, spore-production, and the artificial sections of such creatures as the hydra. Instead of such a multiplication of like principles, these mutilations give rise to principles of an inferior order, such as might be expected to inform bodies the organizations of which are in various ways abnormal or imperfect. As the dead body of a dog is no longer a dog, or a single organism at all, but is a mere mass of various material substances of different kinds; so with the disappearance of what is the dog *par excellence* (namely, the individuating principle which built up its body from the germ and maintained it during life) there simultaneously come into being the various separate principles or energies which constitute and still inform its various parts and ultimately its various material substances, till these

* *I.e.* directed towards a definite end.

are resolved into their ultimate chemical elements, each element having, besides its own material substance, its own characteristic energy which causes it to be that which in fact it is. Surely this is the teaching of common sense no less than of philosophy! Thus we come to have during life a normal multiplication and generation of complete psyches and principles with powers of further generation of their like, and at death, or as a consequence of mutilation or disease, we have a multiplication and generation of incomplete principles of energy which have not the power of further generation in their own likeness.

There is another much smaller series of similar facts which the same conceptions serve to co-ordinate and explain.

It is possible not only to graft * one tree upon another, but to engraft a part of one animal within another. Thus the tail of a young rat may be cut off and planted under the skin of a fully grown one, and not only will it live there, but it will complete its normal and natural growth, its imperfectly formed, immature bones growing into the full degree of ossification they should attain to in the adult. How, it may be asked, can such things be, if each living body has its own absolutely single, immaterial, unifying principle? Must not the rat with the additional tail or the grafted tree have two such principles informing it, or, if not, which has given place to the other? Now, in the first place, we have seen † and are all familiar with the reciprocal action of soul and body, and this unquestionable fact helps us to solve such enigmas. A separated portion of an animal—such as the young rat's tail—informed by a temporary individuating principle of a very inferior kind to that of the body whence it was removed, may be well understood to lose it, and become animated by the principle of the energetically living organism into which it has been engrafted. By degrees it ceases to be a separate structure, and becomes indissolubly one with the body of the adult rat. Simultaneously with this change, the temporary form of energy of the fragmentary structure will recede and give place to the full action of the entire organism's dominating principle which is expelling the other. But the triumphant

* See above, p. 339. † See above, p. 389.

enduring principle may nevertheless receive modification from the subordinate energy thus brought to play upon it, and result in diseased conditions, and possibly in modifications subsequently transmitted by generation.

In various lower organisms, as we have seen,* two bodies, each with its own principle of individuation, will meet and blend, growing into a single organism, and we cannot doubt (since the psyche is one unity with the body) that their respective principles have also disappeared, to give place to another with slightly different activities and greater powers. Similarly with respect to the grafting of plants; as the two vegetable organisms grow together and become one, so with absolute simultaneity may their principles of individuation give place to a new one different from either and informing and directing the life-processes of the whole complex structure.

Thus we see that not only the vital actions of maturity, but generation and all the processes of the individual development of every organism may be explained as being initiated, carried on, and perfected by the action of its one immaterial principle of individuation, or psyche—that is to say, it is a process of *psychogenesis*.

Cosmical hypotheses.

Having now considered, to the best of our ability, the apparently fundamental nature of living bodies as well as of the inorganic world, we may return to consider once more (in the light thus gained) that philosophic conception which is called the "mechanical theory of the universe," and cosmical hypotheses commonly taken as being akin to it.

Can we *now* say it is evident that everything we know, save the human soul, cannot possibly consist of various aggregations of one form of matter and one kind of energy—which energy might be called "the soul of the world," or that the universe cannot consist of some one utterly unimaginable entity whereof material extension and immaterial energy may be two intrinsic attributes? In reply, it must be affirmed that not even now does it appear to the present writer to be evident that either of these hypotheses is necessarily impossible, though it does

* See above, p. 339.

seem evident that they accord with the facts of observation indefinitely less well than does the hypothesis which is advocated in this chapter—namely, that the universe consists of a multitude of bodies each a compositum of matter and energy, the kinds of energy being fundamentally multitudinous and diverse. This better accordance with fact seems evident from the phenomena of life already noted; but when we come to consider evolution,* its better accordance will be still more evidently apparent. But with respect to the hypotheses that there is fundamentally but one kind of matter and energy, or that there is fundamentally but one kind of inconceivable entity whereof extension and energy are attributes, neither one nor the other really accords with what is popularly understood as the mechanical conception of the universe—a conception which is fundamentally irrational and necessarily false. For a mechanical theory of the universe supposes that all its phenomena are really reducible to, and in fact consist of, matter and motion. It affirms that all the activities of which we have experience, from the earth's revolution on its axis to the thought of the reader in reading this sentence, are but different forms and modes of motion, molar or molecular, of solid material particles. The supreme absurdity of this conception as applied to thought, and therefore to the soul of man, we have, it is hoped, fully seen; nor does the admission that the above-referred-to cosmical hypotheses are not evidently false in the least do away with the before-stated † objection, that to call "pains and pleasures" "modes of motion" is not to explain them, but simply to apply words in a misleading manner.

Let the supposed single unknown and unimaginable energy to be called "the soul of the world" be what it may, it remains not one bit less a substantially and altogether distinct thing when (forming one entity with a metal bar) it vibrates as a pendulum, from its existence when (while forming one entity with a living organism) it energizes in sensation. Similarly, let there be one unimaginable entity with the two attributes, extension

* See the last chapter. † See above, p. 396.

and energy, yet the aggregations, conditions, and forms of the portions (so to speak) of this entity must be conceived of as substantially and really, however temporarily, distinct, while remaining in two conditions the properties of which are so divergent as are those of a piece of metal and a greyhound. The temporary character of such distinctions is no bar to their substantial reality, as is evident from the fact that on no hypothesis have the various distinct material substances more than a temporary distinctness. These hypotheses, then, do not really accord with the popular mechanical philosophy. But a mechanical theory of nature—however unsupported and unreasonable—is a conception which is very tempting to many men; it is a theory which has been thus tempting for thousands of years, and which will probably be so for thousands of years to come. Short cuts to knowledge are always tempting, but the special attractiveness of this theory is due, in the first place, to our besetting tendency to accept what is most easily imagined as probably true, and to be especially gratified by images of tactual and visual groups of sensations. There is generally a special quality of distinctness, or vividness, in our sense-impressions of sight and touch compared with our other sense-impressions. How vague, for example, is our imagination of a perfume compared with our imagination of a coloured triangle or cube, or of a ball held in the hand! Vague internal sensations are always described by us in terms of sight or touch. We speak of a "gnawing" pain or a "sharp" pain "like a knife." We say a "rough taste," and we even speak of a "light" character or a "bright" intellect and a "hard" heart, and say that ill tidings have given some one a "heavy blow." Moreover, it is these very sensations of touch and sight which occasion in us our feelings and perceptions of "motion."

Now, as before said, the really scientific explanation of any phenomenon should be a reference to the causes which produce it, but very often what passes for its explanation is nothing more than its reference to a group of objects with which we are already familiar. Our minds, indeed, are so formed that most of us have a decided feeling

of satisfaction when some object or action hard to imagine, is referred to some class of objects or actions easy to imagine; and this feeling of satisfaction is sure to arise at first, even though such reference, when closely examined, turns out to be unsatisfactory. But, as we have seen,* there is nothing so easy for us to imagine as the motions of bodies. They are phenomena which appeal both to sight and touch, while the idea of motion is the most primary, spontaneous, universal, and constantly elicited of all our ideas. Small wonder, then, that the mind should feel an unconscious (or conscious) desire to "explain" everything by "motion," and should repose with a feeling of satisfaction in the reference of any other activity to that category. The functions of nerves and brain-cells, no less than heat, light, and chemical phenomena, *must* be easier to imagine as "modes of motion"—waves, oscillations of particles, or what not—than in any other way, however unsatisfactory that representation may ultimately prove to be. But, as we have seen,† motion is and must be motion and nothing else, and, though it is conceivable that one unknown and unimaginable energy may alike underlie motion and every other physical manifestation of force, that conception in no way justifies or gives the slightest validity to a real belief in all the activities of nature being "modes of motion." Such an explanation would be like a description of all the poems which have been ever printed as feelings of colour, because we cannot become acquainted with any one of them but by the aid of visual sensations in ourselves or in those who may read them to us. Moreover, the incongruity of explaining the feelings and cognitions of animals by the mere idea of motion, is enormously greater than that of explaining heat and light as modes of motion. To say that the fidelity and affection of a dog, the care of a nesting bird, or the acts of an insect which prepares food it cannot eat for a progeny it will never behold—to say that such things are but minute motions to be explained by mechanics, is to mock us with unmeaning or delusive phrases.

* See above, p. 411. † See above, p. 413.

But if the explanation of the phenomena of nature by "motion" and a belief in the transformations of physical forces known to us is unreasonable, no less so is the hypothesis of the universal diffusion throughout the universe, in every particle of matter, of something which the late Professor Clifford called "mind-stuff."* Of course, by making use of inadequate and misleading terms, and by disregarding points of unlikeness, all diversities may easily appear to be reduced to identity. Against such abuse the man of science should energetically protest. The word "life," refers to definite phenomena which are only found in living organisms. A crystal is not really alive, as we see by the circumstance that it does not even tend to undergo the cycle of changes† which are characteristic of life. It does not sustain itself by a process of internal growth, nor does it reproduce its kind and die. Any one choosing to stretch terms may say that particles of inorganic matter "live" because they "exist." But so to speak would be to make the terms "life" and "existence" synonymous, and in that case we should have to devise a new term to denote what we now call "life." We might as well say a post "feels" because we can make an impression on it, or that crystals "calculate" because of their geometrical proportions, or that oxygen "lusts" after that which it unites with and so "rusts."‡ As the late Mr. G. H. Lewes has said, "We deny that a crystal has sensibility; we deny it on the ground that crystals exhibit no more signs of sensibility than plants exhibit signs of civilization, and we deny it on the ground that among the conditions of sensibility there are some positively known to us, and these are demonstrably absent from the crystal. We have full evidence that it is only special kinds of molecular change that exhibit the special signs called sentient; we have as good evidence that only special aggregations of matter are vital, and that sensibility never appears except in a living organism, disappearing with the vital activities, as we know that banks and trades unions are specifically human institutions." Moreover, the term "mind-stuff" indicates a confusion of thought, not only

* See above, p. 140 † See above, p. 327. ‡ See above, p. 303.

between the material and immaterial, but also between thought and feeling. But we have seen in the beginning of this chapter the absolute distinctness between "spirit" and every lower existence known to us—a distinctness which shows the absurdity of the term "mind-stuff." The question, however, will have again to be noticed in the next chapter, under the head of Pantheism. We venture, then, to affirm with confidence that the conception of nature which accords by far most easily with those facts which the study of physics and biology make known to us, is the conception of the coexistence of the five orders of immaterial principles which, immanent in matter, constitute all the different substances and organisms of the world around us, each of which is thus a "compositum" of matter and of some form of immaterial energy.

Existences, real and ideal.

In all organisms there is, moreover, a real and an ideal element. Every group of such objects of a definite kind—every kingdom, sub-kingdom, class, order, family, genus, and species—is made up of actual existences, each of which has its material and its immaterial side; but each group, *as such group*, has but an ideal existence. An order or species, *as such*, has no actual existence in nature, though each exists truly and really as congeries of characters actually present in numerically distinct individual animals and plants. They have this kind of existence not only in our own minds, but also as "objective concepts" * in external nature, corresponding with our ideas or "subjective concepts." If also any Divine Intelligence exists, they must also correspond with the ideas of such an Intelligence, since a Divine Intelligence, if one there be, must at least possess such ideas as even our intelligence can attain to. It was a difference between the conceptions entertained respecting the mode of existence of classes, of such general ideas or "universals," † which distinguished ancient Realism, Idealism, and Nominalism. The difference between the Realists and Idealists of old days was thus very different from that between modern Idealism and Realism. The Ultra-realists of old days held that there was really such a thing as "man in general" or "horse in general," par-

* See above, p. 136. † See above, p. 206.

ticipation in the nature of which made the various men and horses the men and horses they were. The old Idealists (or Conceptualists) held the view above explained—namely, that the groups were ideal only *as groups*, but were actual existences as regards the characters in which the individuals of each group agreed. The Nominalists asserted that such general terms were mere names and nothing more—a belief which the existence of objective concepts absolutely negatives.

Reason in nature.

This world of ours, though the existence of diffused "mind-stuff" is a fiction, thus contains its ideal element, and is, moreover, replete with an intelligence which demands from us an adequate explanation, if nature is to be understood in any satisfactory and satisfying manner. The phenomena of crystallization, the repair in due form of the broken angle of a crystal and the inherent tendencies of different chemical substances to combine in definite proportions, seem to indicate that something remotely like intelligence and volition, though unconscious and insentient, is therein latent. When we recall to mind, moreover, how the subjective conceptions of our own minds correspond with objective relations which exist between external things, the reason of the individual seems to be a participation of that universal reason which finds mute expression in the irrational universe and express recognitions in the human mind. When we consider the marvellous processes of the development of the individual organism from its first germ upwards, and how during its whole life it bears a relation both to the past and the future; when also we consider the processes of repair of injuries and the striking phenomena of instinct,—it is impossible to deny that there is a profound rationality in nature. Nevertheless, it is evident that rationality is not truly the attribute even of brute animals, and still less of stocks and stones. It must, then, be the rationality of something really external to them (however completely it may pervade them), acting as a cause. There is, indeed, a kind of logic in the phenomena of the merely sentient nature of the dog and the nesting bird, the bee and the climbing plant; there is such logic even in the activities of insentient

nature (since we have seen how they correspond with our reason in "objective concepts"); but that logic is not the logic of the crystal nor of the brute; its true position must be sought elsewhere. It is *in* them, but it is not *of* them There cannot be such a thing as "unconscious intelligence," for the following reasons: No intelligence could exist so as to adjust "means" to "ends," except by the aid of memory. But we have already seen that, though actions may be repeated by "organic reminiscence," * nevertheless "memory" is essentially intellectual,† it cannot be predicated, except by an absurd abuse of language, of the lower forms of life, and therefore it can be no rational intelligence which is immanent in living organisms, and presides over their processes of nutrition, repair, reproduction, and instinct.

Nevertheless, Hartmann ‡ and his followers do not on this account hesitate to ascribe true intelligence to unconscious nature; and though such ascription may seem too absurd to deserve serious consideration, it would nevertheless be a mistake to altogether despise such opinions. For just as there are truths which cease to be appreciated because they are not disputed, so there are many errors which are best exposed by allowing them to run to a head. Mr. Butler, who carries this hypothesis of unconscious intelligence to its last consequences, asks,§ "What is to know how to do a thing?" His answer is, "Surely, to do it." And he represents how, when many things have been perfectly learnt, they may be performed unconsciously. Also in a very amusing chapter on "Conscious and Unconscious Knowers," he says,‖ "We say of the chicken that it knows how to run about as soon as it is hatched, . . . but had it no knowledge before it was hatched? It grew eyes, feathers, and bones, yet we say it knew nothing about all this. . . . What, then, does it know? Whatever it knows so well as to be unconscious of knowing it." The author here quoted altogether ignores the great ambiguity which exists in the term "to know."

* See above, p. 169. † See above, pp. 31, 186, 220.

‡ See his work on "The Unconscious," a translation of which has been published by Messrs. Trübner and Co.

§ See his "Life and Habit," p. 55. ‖ Page 30.

This ambiguity we have already* fully explained, and that explanation deprives such paradoxical remarks as those just quoted of all the force they might seem to have. That the inorganic world, as well as the organic, is instinct with reason, and that we find in it objective conditions which correspond with our subjective conceptions, is, as we have several times said, perfectly true; but when once the profound difference between these organic habits and intellectual memory is apprehended, there will be little difficulty in recognizing the yet greater difference between any kind of real knowledge on the one hand, and that unconscious "organic correspondence," before described,† on the other. That the *absence* of consciousness in actions which are perfectly performed does not make such actions acts of "perfect knowledge," is demonstrated by every calculating machine. No sane person can say that such a machine "possesses" knowledge, though it is true that it "exhibits" it. Similarly, we must refuse to apply the terms "memory" and "intelligence" to the merely organic activity of animals and plants. The assertion that in the vegetable and lowest animal forms of life there is an innate, immanent, but unconscious intelligence, is an assertion which is self-contradictory, and is therefore fundamentally irrational. For any one who says that blind actions (in which no end is perceived or intended) are truly intelligent ones, abuses language. The meaning of words is due to convention; and any one who calls such actions truly intelligent, thereby separates himself from the rest of mankind by refusing to use their language. What experience have we which can justify such a conception as that of "unconscious intelligence"? Consciousness is the accompaniment of all those actions which we *know* to be intellectual and rational, and of none others; all the actions of animals being, as we have seen,‡ explicable by consentience and their allied merely sensitive faculties. Thus "unconscious intelligence" is for us an unmeaning and self-contradictory expression, like "a square pentagon," or "a pitch-dark illumination." Nevertheless our experience is *in favour* of the existence of an intelligence which can

* See above, p. 189. † See above, p. 169. ‡ See above, p. 355.

implant in and elicit from unconscious bodies activities which are intelligent in appearance and result. Thus we can construct calculating machines and train animals to perform many actions which have a delusive semblance of rationality. "Truly intelligent action" we know as being intelligent and rational in its *foresight*, and therefore as necessarily conscious in the very principle of its being. "Unconscious, appropriate action," improperly called "intelligent" or "wise," is that which is intelligent and wise only in its results, and not in the innermost principle of the creatures (whether living or mere machines) which perform such action. To speak technically, we have "formal" and "material" * intelligence, as we have "formal" and "material" vice and virtue. It is the failure to apprehend this distinction which is at the root of a vast number of current philosophical errors, and the error which consists in asserting the existence of "unconscious intelligence" is one of them. "Intelligence" exists, indeed, very truly in the admirably directed actions blindly performed by living beings, as also in processes of repair † and reproduction.‡ It only exists in them, however, "materially," and not "formally." It exists "formally" in some cause external to them, which has implanted in them the powers they exercise in such admirable modes. The human mind, when developed to a certain extent spontaneously seeks the explanation of these phenomena in something external to them, which can be regarded as their primordial cause. To the investigation of this question, the supreme question of science, the next chapter will be devoted.

* As to these terms, see above, pp. 239, 249.
† See above, p. 170. ‡ See above p. 171.

CHAPTER XXVI.

A FIRST CAUSE.

The existence of the universe as we know it, shows that it must have had God for its First Cause, and makes known to us at least some portion of the Divine purpose in creating it.

Law of causation and the universe—Needs an adequate First Cause, God—Pantheism—God and the intellect—Motion and causation—Creation—Nature's prodigality—The evils of life—Possibility of inscrutable purposes—Seemingly unworthy creations—Anthropomorphism—God's existence and creating action—Difficulty from tardiness—A future life and theism—Recapitulation—Final causes—Hierarchy of ministrations—Highest purposes.

HAVING completed the brief survey we have been able to take of the universe about us, and sought for the best answer we could find to the question "what things are," we have next to inquire into their causes, and learn as far as we may, "why things are."

The world was represented in the last chapter as containing two fundamentally different kinds of entities—entities capable of thought (spiritual entities), and entities not so capable. In the latter category we placed every known body, every kind of substance, and every non-rational living thing; each being regarded as a compositum of matter and some form of immaterial energy, and yet as being each one true, substantial unity. All these members of the universe, possessing very diverse powers, were further stated to constitute an orderly whole, replete with a logic and reason not formally present therein, save in those spiritual entities—the souls of men—in which reason and logic were present, both materially and formally.

We saw in the fourth chapter of the first section * of this work that the law of causation is a primary, universal, and self-evident objective truth, declaring that every change, or new existence, and every existence which has not within itself a sufficient reason for its being as it is, must be due to some cause. We also saw, in our second section,† that science, even physical, is continually occupied with investigations concerning causes, and we terminated our last chapter by declaring that the time had come to apply ourselves to the investigation of the supreme question of all science, namely, that which treats of the existence and nature of a primordial Cause of the universe—the fountain whence all its powers and properties have sprung, and spring. *Law of causation and the universe.*

Now, incessant change is the condition of the world about us, and new existences are continually arising within it. That each and every one of those changes and new existences must have had its cause, or group of causes, is what no sane person will deny. A multitude of such causes are discoverable by physical science; but our present object is to consider those causes and existences, not as isolated or in groups, but as forming one great, unimaginably complex whole. Does science unequivocally point to any beginning of such a whole? That it points both to a beginning and to an end of the world we actually behold, and to that of our solar system, is hardly to be questioned; but, compared with the whole material universe, our planet is but an atom of cosmic dust, and our solar system is, as it were, but the gyrations of a few such particles out of a vast simoon of a stellar Sahara. It cannot be positively affirmed as an evident datum of science that the whole cosmos, considered as one vast unity, ever had a beginning, or will ever have an end. It is conceivable that the cosmos may be a real system of perpetual motion in one of two forms. It may be conceived of as eternally passing, as one whole, from a state of nebula to that of worlds and suns, and back from a state of worlds and suns to a state of nebula; or it may be conceived of as undergoing such changes locally—now here and now there.

* See above, pp. 48–50. † See above, pp. 80–83.

According to the former conception, the stellar universe unceasingly pulsates to and from a state of nebula; according to the second conception, such a change may eternally creep over the cosmos of suns and worlds, so that each part in its turn, but never the whole simultaneously, may undergo such a transformation. Reason and science do not positively affirm that such changes may not have proceeded in cycles for a past eternity, owing to an eternal arrangement, or collocation, of causal agencies and conditions. As we saw in our first section,* our reason does not tell us that everything must have a cause, but only that some existences must be caused, and that some cause must certainly precede any change or new condition of existence. Now, a little reflection shows us that the cosmos could never have grown into the state in which we now know it to be, from one single universally diffused and similar substance, unless that substance was acted on by something external to itself. It has been absurdly represented by Herbert Spencer, that if a homogeneous universe were only unstable, this instability would account for the world's development. But, as Dr. Gasquet has well said, "instability" is no principle of action, but merely means a state in which, equilibrium being very delicate, a very slight external force is enough to disturb it. But evidently no internal change could take place in a homogeneous universe without some external action. Such a change would contradict the principle of causation, and also the first law of motion. It is impossible to obtain the category of quality from that of quantity; and one substance everywhere identical in the mode of its being and activity, and with nothing whatever external to it, or everywhere pervading it but distinct from it, could never alter at all. Whether it was large or small could make no difference, even if it could be supposed to have dimensions, since, by the hypothesis, it would always have existed absolutely by itself, and therefore could neither be large nor small, those being essentially relative conditions. The universe, therefore, if it existed from all eternity must, as a whole, have existed from all eternity in the multiform complexity we know it

* See above, p. 48.

to exist in now. Moreover, such a universe, as one whole, could never itself have been evolved by any process of natural selection. An eternal universe could never have been naturally selected—that is, have proved itself, through competition, to have been a universe able to survive others —because, by the hypothesis, it must have eternally existed by itself, and could, therefore, have had no competitors. But the universe we know, is a universe of most complex composition, replete with order, beauty, and harmony, governed by general laws with most admirable correlations, and the abode of at least one race of beings (men) possessing intellect, capable of understanding and appreciating truth, goodness, and beauty, and endowed with a wonderful power of voluntarily intervening in the chain of physical phenomena, and so changing (to however relatively minute an extent) the whole subsequent course of events. Moreover, these human beings did somehow come into existence in a world previously devoid of organisms endowed with any such marvellous faculties.

Needs an adequate First Cause —God.

Now, if the universe be conceded to have had a beginning, then it is simply evident that such a beginning must have been due to a First Cause ; and if the universe never had a beginning, then a First Cause is equally required to account for those special orderly arrangements of secondary causes, and those collocations of conditions which have eternally existed in their mazy complexity from all eternity, or, indeed, for its existence at all, or for the existence of any part of it not containing a sufficient cause for its existence within itself. An eternal, most complex mixture of different substances, with very different powers, all harmoniously co-ordinated, and which were never otherwise than harmoniously co-ordinated, could not evidently contain within itself the sufficient cause for its own existence ; and the greater the number of the natural laws which physical science reveals to us, thus acting in harmony, so much the more does reason make evident to us the necessity of one integrating First Cause, sustaining that harmony unchanged from all eternity. But a First Cause necessarily acting from all eternity must be eternally necessary as long as its effects endure. Hence, an ever-present

and constantly causing or sustaining principle, must endure and energize now and ever as long as that universe, which it has from all eternity sustained and caused, continues to exist. We know already that any and every existence which can be seen not to have a sufficient reason for its existence within itself, must have had a cause,* and the Cause of such a universe must be a First Cause. That First Cause itself, however, can be conceived of as having within itself the sufficient reason for its own existence. There is also no incongruity in supposing a perfectly simple substance existing eternally uncaused along with the complex universe which it unceasingly causes.

The nature of that First Cause is also in some respects revealed to us by the nature of its effects, since a cause must always be at least adequate to produce the effects it causes. To this assertion it is sometimes objected that saying a cause is adequate to produce some given effect really means no more than saying that it can produce it, and we are asked how we could know, *à priori*, the "adequacy" of a piece of steel to produce a wound, or of a flame to produce a burn? To these questions it may be replied that the "adequacy" is not in the steel or in the flame, but in these as affecting a sensitive organism which they may injure. The organism and the agents are together adequate to produce the effects cited, and can be seen by the mind to be adequate thereto. We cannot, of course, always know *à priori* what the effects of any change will be; but we can sooner or later know *à posteriori* not only that certain effects have followed from certain causes, but also how it is that these causes have been able to produce such effects; and the number of instances in which we can see this, enables us to judge that (had we sufficient means of knowledge) we might know how they do it in all cases, *i.e.* we should apprehend their adequacy. But apart from this, we may take experience as our guide, and we certainly have no experience of life being produced by the lifeless, or of sensibility and intellect appearing without their pre-existence in the agents which caused their appearance. No scientific treatise has ever

* See above, pp. 49, 50.

been produced by the uncultured; only a strong man can lift a heavy weight; and no mere donkey-engine can drag a long and heavy train. In short, *memo dat quod non habet.* Now, amongst the effects produced quite recently (geologically speaking) in this planet there are three which are notably distinct from all the others; namely (1) intellect which can perceive truth; (2) intellect as perceptive of moral worth; and (3) free-will. Therefore the First Cause, as able to produce such effects as these, must possess eminently corresponding attributes, namely, an intellect, goodness, and will, of which our own is, as it were, a most faint reflection. In other words, the First Cause must be personal—a person being * that which possesses both intelligence and will—and as the First Cause of a universe full of active powers which have resulted in creatures capable of perceiving and following goodness, that First Cause, as absolute Power, Intelligence, Goodness, and Will, is, and must be God.

Pantheism.

If it be granted, however, that there must be such a First Cause, may it not form essentially one substance—as monism † teaches—with the universe which it causes, so that the latter is but a mode or emanation from that which in this sense causes it? Could matter, it may be asked, have been produced from mind any more than mind from matter? and may not the great whole consist of an eternal substance possessing the two attributes ‡ "thought and extension," so that the First Cause, or God, is everything, and everything is God?

Now, in one sense, the First Cause may be truly said to have these two attributes. For an absolute First Cause must have, eminently, every positive perfection of every extended thing, as well as of every intelligent being, so that even stocks and stones may be said to participate, in their degree, in that correspondence or resemblance which must exist between every effect and its cause. But extension, though a perfection as existing in the material

* See above, p. 139. † See above, p. 392.

‡ This is, of course, a fundamentally different conception from that pronounced not evidently impossible in the last chapter (p. 440). That hypothesis was the supposition that every entity, except thought, might be one substance, of which extension and immaterial energy were attributes.

bodies we know, is but a *relative* perfection, and not an absolute one like *e.g.* intellect or goodness. We see intuitively by our intellect that a bad volition can never be a perfection, but it does not show us that there may not be something better than extension. Extension is a perfection in the bodies which possess it, but would be anything but a perfection in higher natures to which it would be repugnant. There could be no perfection in an attribute which would bind its possessor to one corner of the universe, as the possession of extension would do. To say that because there is a relation of affinity and likeness between an artist's conception and the painted canvas which has embodied it, therefore it would be a gain to the artist himself if he also were painted canvas, would be a most absurd statement. Its absurdity, however, is as nothing to the absurdity of supposing that God suffers defect by not having the actually existing limitations and conditions of the creatures which owe their very existence to Him. A certainly knowable, but yet inscrutable First Cause, which is essentially active, must, it is evident, be out of all proportion better symbolized by energy than by matter, and far best of all by that form of activity which we know as intelligent volition; and perfectly intelligent volition must be good. As to the production of mind from matter being as possible as that of matter from mind, the very essential activity of the First Cause negatives the proposition. The reader's common sense will, no doubt, recognize at once that an intelligence infinitely transcending imagination, may far more easily be conceived of as the cause of the universe with its physical and vital powers, than that intellect, moral perception and will, should have been produced by the mere play of unintelligent energies upon matter. With respect to the conception of everything being God, which is Pantheism, every sane mind may be trusted to declare that whatever it may be, it certainly is not itself the Divine First Cause; unless it is so not only without knowing the fact, but *against* its own conviction. Such a mistake would not be an instance of a mere *negative* error about a matter beyond our power to conceive, and therefore to inquire into. It would be a *positive* error about a matter

within our power to conceive, and one about which we can inquire and form a definite judgment. To attribute not only ignorance but such an absurd mistake to the fountain of all the reason, goodness, and truth of the universe, would be to attribute to the First Cause a character which would make it altogether inadequate to produce those very effects which we know are produced, since we are conscious of them in our own minds, when we certainly know we can perceive some truths with certainty—as when we perceive the truth that we have any thought or feeling which we know we at that time actually have. If we do not know this, we fall (as we saw at the very commencement of this work) into utter scepticism, and all further discussion becomes idle and purposeless. It is true that very celebrated thinkers have held that as everything that exists must have existence or "being," therefore everything must be fundamentally one and the same existence. This, however, is to confound the most abstract of all abstract "ideas"—the "*idea* of being"—with the most concrete of all concrete "facts"—the "*fact* of being." This most absurd confusion between the world of ideas and the world of real, actual existences, is what underlies that celebrated saying of the German philosopher Hegel, "Being and non-being are identical." Of course, the *idea* of "being," since it applies to everything, "can have no distinctive characters or attributes," for if it had such, it would no longer apply to everything. Similarly, also, the *idea* of "non-being," or nothing, "can have no distinctive characters or attributes," and so far these two ideas are negatively alike; just as a plum-pudding and a line of Shakespeare are negatively "alike," in that neither of them is made of brass. But none the less, actual existence (not the *idea* of it) differs *toto cœlo* from actual non-existence, as is evident both to common sense and the most profound philosophy. But other objectors say truly, as we have ourselves said,* "Subjective concepts must have objective entities corresponding to them," and therefore, since we plainly have the subjective concept "being-in-general," there must also be a corresponding objective entity, or objective "being-

* See above, pp. 136, 137.

in-general," which entity is the same in all existing things. We must, however, carefully distinguish not only between oral expressions and their corresponding concepts, but also between those concepts which are partially, and those which are wholly alike. We must distinguish between concepts which are alike in so far only as they refer to one or more characters which the things conceived of have in common, and concepts which are alike because they refer to things which we see to be positively identical, or absolutely alike in their totality. The same verbal expression may refer to conceptions which are very diverse —as is notoriously the case, in English, with the word "box." There is no wonder, then, if the word "being" denotes more than the two concepts already distinguished, namely, "actual being" and "ideal being." Such is indeed the case. We say not only that a thing has actual "being" or existence, but also that a thing has a reality, or "being," not yet actual, but which will be made actual on the occurrence of the requisite conditions—such as the existence of a chicken in a new-laid egg. Here the word "being," has plainly two significations—according as it refers to what is actual or what is only possible, or "potential." There is evidently a great difference between possible being, and mere non-existence—*e.g.* between the universe which has actually come into existence and another universe, differently constituted, which we may suppose to have been possible. Next, as to concepts: We apply the conception of "actually existing being" to all things which in fact exist, however diverse they may be; and a corresponding objective quality is to be found in the actual existence of the things thus conceived of. But that subjective conception of ours by no means implies that all these things have a real substantial something in common, but only that they agree in a mode of being. They agree in that they are existing, and not ideal, entities, and also in being actual and not merely possible. There is thus a correspondence between these highly-abstract conceptions and the objective existences they refer to, similar to the correspondence which exists between very ordinary conceptions and the things they refer to. We have the

subjective concept "cattle," with which corresponds the objective characters of certain animals. The objective concept really answers to the subjective one; but there is no objective "cattleish" substance which exists and is variously modified in every ox, sheep, and horse. Similarly, for everything which has either actual or possible "being," there is a real corresponding objective reality—its state of existence. But there is not, and need not be, any objective substantial being which is variously modified in everything which exists. Other dreamers tell us that, do what we may, we cannot know that there is anything objective at all, but that the universe and ourselves may be explained as modifications of a self which never can get beyond or outside itself, or know anything whatever which is objective. To this absurdity it is a sufficient answer to say that such an objector must at least allow that *if* he knew anything outside himself it *would be* objective. But to allow this, is to allow a knowledge of a hypothetical objectivity. Yet to know what anything would be *if it were* objective, is to know certain conditions attending objectivity, and that is to know something objective after all, and so the absurd objection referred to falls to the ground. A very different but not less decisive refutation of this notion of the substantial identity of all things may be drawn from our power of ethical perception and the supreme certainty we have that there are actions which are right and others which are wrong. For if all things are God and every action is a Divine action, then every action must be good, not only in its elements, but in those circumstances under which it may occur. If acts prompted by the most self-denying devotion to duty are to be reverently recognized as one mode of that which alone Is, not one bit less is the traffic of the courtesan another such mode; and if the chastisement of the assassin may claim Its sanction, so the assassin may also equally claim it for the act on account of which he is chastised—which is absurd.

But, rising above these idle dreams and the madness of idealism, we know that we have on all sides of us a multitude of things, animate and inanimate, that do not think and yet are replete with a logic which is in them

but not of them. What, then, is this rationality of the irrational? It is a rationality which is very really, though but materially, present in the irrational world, while it is formally present in that world's Cause and Origin. We see the most amazing operations of an intelligence which is not that of the animate or inanimate creatures which perform them, and which, if there is no Intelligent First Cause, may well be called the "miracles of unreason." To the theist alone is a satisfactory explanation of such phenomena possible. Reason (and to pure reason is our only appeal), candidly applied to the consideration of that universe of which man is a part, teaches a plain lesson—the existence of a constant, pervading, sustaining, directing, and all-controlling but unfathomable Intelligence, which is not the intelligence of irrational creatures themselves nor yet our own. Such is the supreme truth which nature eloquently proclaims to him who, with an unprejudiced reason, will carefully consider her ways. He can hardly fail to discover, pervading the material universe, an action, the results of which harmonize with man's reason; an action which is orderly, and disaccords with blind chance, or a fortuitous concurrence of atoms; but which ever eludes his grasp, and which acts in different modes from those by which he would attempt to accomplish similar ends. We are convinced that the more nature, including man, is carefully studied, the more it will be plain that in the action of this all-pervading, but inscrutable and unimaginable Intelligence (of which self-conscious human rationality is the utterly inadequate image, though the only image attainable by us) is to be sought the sole possible explanation of the mysterious but undeniable presence throughout nature of a rationality in that which is itself irrational.

God and the intellect.

Let us now glance at another consideration which may serve in its way to bring home to us the necessary existence of a Divine Primordial Cause.

In the first place, let us consider the nature of primary truths, such as that the whole is greater than its part, or the principle of contradiction. The special character of such truths is, as we have seen, that they need no proof (being themselves self-evident), while they are at the same

time themselves indispensable in order that anything else may be proved. Their clearness and certainty necessarily exclude all doubt from the mind of any man who understands them; but though they affirm themselves indisputably, they do not explain themselves. They tell us categorically and unquestionably that they exist, but not how they exist. The rays of light they bring to the intellect are most luminous, but nevertheless they are rays, and their source—the luminary whence they radiate—remains hidden from our direct mental gaze, and can only be indirectly known through meditation and reflection. Truth, as we have seen, is a correspondence of thought with things. What, then, is and must be that with which these at once highest yet most fundamental of all truths correspond? Upon them all the most certain deductions and inductions of science and all the most practical rules of art ultimately repose. The progress of the sciences and the successful practice of the arts absolutely demonstrate to us that truth is, as has been said, a correspondence between our perceptions and real, external existences, and the degree of perfection of each science and art depends directly upon, and varies with that degree of correspondence. Can it, then, be reasonably supposed that the dicta of the science of sciences—the most supreme and certainly evident of all our perceptions—do not also correspond with some real external existence? But with what objective reality can those truths correspond which are absolute, universal, and necessary, as we have seen them to be,* extending to the ultimate limits of all enduring or extended things—with what reality can they correspond except an absolute and infinite First Cause? They must reflect upon us rays of truth from an inconceivable source of all light and all truth—from God. To deny that any real objective existence corresponds with the ultimate basis of such subjective thought, is to deny that there is any such correspondence between internal thought and external reality as is implied in all our knowledge of external nature, from that needed for the pursuit of the highest science down to what is indispensable for the exercise of the lowest mechanical art.

* See above, p. 38.

Motion and causation.

Another argument for God's existence is a truth which underlies the mechanical conception of the universe, and so seems to afford it a certain amount of support. This truth is the dictum that the universe cannot be essentially self-moving, and therefore must have received (since it is now full of motion) an impulse from without. We say "essentially" self-moving, because it is conceivable that matter may have been endowed with intrinsic motion from all eternity. But if such were the case, it must none the less have been eternally endowed with this intrinsic motion by an extrinsic First Cause, on the same principle* as that which we have lately seen makes it evident to us that a complex universe, like that we see about us to-day, must, if eternal, have had from all eternity a First Cause possessing within itself a sufficient reason for its own existence, as a sufficient reason for the existence of such an eternally complex, orderly universe. The argument, moreover, which thus applies to the universe considered as one whole, applies no less to every constituent portion of it, every cell of every organism, and every molecule and atom (assuming, for argument's sake, the existence of such constituents) of it, considered as one whole, though a most minute and subordinate "whole."

Creation.

God, then, as the First Cause and ultimate principle of the universe and of all which it contains, must be regarded as its Creator, whether its Creator from all eternity or its Creator at the commencement of all time. Of eternity and of everything out of, or antecedent to, time, we are, of course, utterly without experience, and such things are consequently as utterly beyond our powers of imagination. This is not all; when we even attempt to conceive of such things, images of succeeding events and objects necessarily enter the mind to attend upon and sustain such conceptions. We are thus apt to be misled in our judgments which tend to be enslaved by such images of things in time. This it is which makes the idea of absolute creation or absolute annihilation seem inconceivable to us. Such creation and such annihilation are not only quite conceivable, but can be (since they are) actually believed

* See above, p. 453.

in as facts of the past and future respectively. When, however, we try to conceive of the creation of the universe we cannot help imagining a space and time anterior to its appearance; and when we try to conceive of the annihilation of the universe we cannot help imagining the duration of an empty space after it has disappeared. These are, of course, mere deceptive mental images, and when their fictitious nature is recognized the difficulty which attends the conception of creation and annihilation disappears. But though creation is, of course, *unimaginable* (being, as before said, a thing utterly beyond all our experience), yet even the late Mr. G. H. Lewes has admitted the truth of what is here asserted. He says, "When it is argued that the creation of Something from Nothing, or its reduction to Nothing is unthinkable, and is, therefore, peremptorily to be rejected, the argument is defective. The process is thinkable, but not imaginable." We cannot, as before pointed out,* imagine a limit to the universe or existence apart from time; but that does not even tend to show that space is infinite or time eternal. Physical science, being devoted to the investigation of the co-existences and successions of phenomena, can express no valid judgment as to creation one way or another. It is absolutely beyond its competence, and it can have no right to say anything either for or against it.

Some very silly persons bring as an objection against the idea of absolute creation the dictum, "*Ex nihilo nihil fit*," "Nothing can come of nothing." The saying is, of course, absolutely true, but in no way to the point. The hypothesis of creation does not suppose "nothing" acting, but "God"—who is represented with utter inadequacy by *everything* we know. Again, the idea of creation does not imply the formation of things by God out of nothing, as if nothing were a sort of substance out of which God drew them, or from which He fashioned them. It implies that, God caused that to be which absolutely was not before; but as to the "how," it is, of course, utterly without any implication. The "how" is quite inconceivable.

But though creation is quite unimaginable, and only

* See above, p. 409.

with difficulty conceivable, there are nevertheless in nature various natural processes more or less indirectly imaginable which may help our conception of Divine creation. The substances of the inorganic world, possessed of physical forces only, persist unchanged and unchanging, save in so far as they may be acted on from without. Even the lowest forms of verdant vegetable life are, as we have seen, wonderfully different from this. They need, indeed, the stimulus of external physical forces, but under that stimulus they possess the marvellous power * of forming and presenting to our observation organic products, and by an immanent internal activity of creating for us, in the lowest sense of that term, from mere inorganic nature, matters (notably their reproductive elements) which, before their activity energized, absolutely did not exist. The lower animals exhibit a more marked internal spontaneity, whereby they create a profusion of objects which before were also absolutely non-existent. As we ascend in the scale of animated nature spontaneity increases, and melodious or discordant sounds, marvellous reflex and instinctive actions, and, ultimately, sensuous cognitions, are produced. Finally, in man these powers attain their apogee, and he, by his marvellous faculty of free volition, truly creates. He actually brings existences into being, things which otherwise never could have been (namely, definite actions, each with a certain character), and changes by his will the whole subsequent course of nature, so far as it may be connected with actions he, by his free-will, determines to perform. But we have also experiences in the arts which may help us greatly to understand the idea of creation. The painter who images forth conceptions replete with beauty and significance, truly creates. He does not, of course, create his canvas or his pigments, but the picture (abstracting from God's universal sustaining activity) is actually his creation, and his creation only. The thought of the poet and the harmonious conceptions of the musician need, of course, matter and motion for their manifestation to us, but that in no way detracts from the fact that the wonderful combinations formed by them arise in the world

* See above, p. 333.

as new facts and marvellous creations. Let us imagine all the artistic creations of men suddenly destroyed. Would the fact that the quantity of matter and of motion remained unchanged, though otherwise distributed, make such destruction any the less a real, absolute annihilation of the artistic manifestations themselves? If the destruction of such things would, then, be a true annihilation, their production must also have been a true creation.

A careful meditation over the phenomena thus manifested to us in a wonderful ascending chain of spontaneous creations of different orders and degrees, will greatly serve to facilitate the conception of that creation which is Divine. We must, however, of course, always recognize the fact that no actions of any creatures, however even superhuman they may be considered to be, can do more than shadow forth with utter inadequacy, though for us with great practical efficiency, any action of any kind performed by God Himself.

It may be well now to consider certain objections which, on various grounds, have been urged against belief in a Divine First Cause, at once the Creator and Sustainer of a universe which is everywhere pervaded by His incessant activity.

These objections are said to be based upon (1) nature's prodigality; (2) nature's cruelty; (3) unworthy natural phenomena; (4) the anthropomorphic nature of our ideas about God; and (5) difficulties which follow upon an assertion that the world has been created.

The first objection affirms that nature's prodigality is such that it cannot be due to a First Cause possessing both perfect wisdom and unlimited power.

Nature's prodigality.

The Divine First Cause, whose necessary existence is thus inferentially evident to our intellect, is revealed to us qualitatively in diverse degrees, according as we direct our attention to one or other of the various orders of existences known to us. Thus if we confine our attention to the inorganic world alone, strongly as we may be impressed with the power and wisdom displayed therein, the Divine beneficence remains hidden from our gaze. The living world affords us a very different and far less incomplete revela-

tion, yet it is only through the contemplation of the highest human faculties that the conception of God becomes distinctly manifested to our minds. It has been said, "Nature conceals God and man reveals Him." This is too unqualified a statement. It should rather be said that nature (apart from man) reveals to us one aspect of the Deity, while the moral world makes known to us another, and seemingly at first a very different one. This apparent difference, however, is only due to a defective flexibility of the imagination—a defect very common amongst persons who have been long exclusively occupied with only one kind of study, whether physical or psychical. The theist who has arrived at his theistic convictions from quite other sources than a consideration of zoological or botanical phenomena, may nevertheless very reasonably make use of such phenomena as tests of the reasonableness of convictions which have been otherwise gained. Let us, then, now apply ourselves with fearlessness and complete candour to the consideration of the first of the just-enumerated objections.

It is said that the foolish waste and blind prodigality of nature, when "of a thousand seeds she often brings but one to bear," conflict with our conceptions of "wisdom" and "purpose," as attributes of the First Cause, and we are asked whether we should consider that man wise who spilt a gallon of wine in order to fill a wine-glass?

But surely it may without any difficulty be supposed that any natural process which has a purpose apparent to us may have a multitude of other purposes also, and that the one purpose we apprehend may be but an exceedingly subordinate purpose amongst the many present to the Divine mind but hidden from our own. It has been suggested that if the big-bellied, small-brained Labyrinthodonts, which existed amidst the rank vegetation of the Carboniferous period could have had any thoughts at all, they might have deemed that the constant rain of countless minute fern spores around them was a process of sheer waste. But we who know the numberless purposes which coal serves, and the multitude of ends it enables steam-engines to fulfil, know that such Labyrinthodonts would

have judged wrongly. We know also that their error would have been owing to their inability to foresee events of what was, to them, an incalculably remote future, and of a nature which no experience of theirs could have by any possibility enabled them to imagine. Suppose a brood of young birds to die before they are fledged, is there necessarily any waste occasioned thereby? By no means. Their bodies serve to nourish various other creatures, and these a multitude of others, till ultimately swarms of bacteria reduce the various organic substances to their proximate or ultimate elements, thus serving to nourish vegetation—the food of animals—and ultimately ministering to the service of human beings. The man who spills a gallon of wine in order to fill a wine-glass is not wise, unless the wine he so spills answers some other purpose he has in view, and which he desires as much as the filling of the glass. In the latter case he is not unwise in spilling it. But the idea of God implies a Being who is at once the one ultimate Cause of *all* the processes of nature. Since He wills and intends them *all*, it is impossible but that whatever results must fulfil His intention.

Nature is so arranged that the purpose of its First Cause can never be defeated, happen what may. The failure of one end is but the fulfilling of other and different ends. When the matter of the artist's or philosopher's brain becomes the prey of lowly organisms, it fulfils one Divine purpose, and another when its living activities aid in producing creations of beauty and wisdom. It is as impossible for any accident to defeat the purpose of Him whose will ordained every process, as it is for any man, by acting in opposition to what his conscience tells him is God's will, to do otherwise than stultify himself by hastening on the fulfilment of God's purposes in some other way. There is truly no such thing as real failure, no such thing as absolute waste, in the whole universe of being.

The evils of life.

The second objection affirms that the pains and evils of life, endured even by animals, show that the world cannot be the creation of a being absolute in goodness and infinite in power. But this objection, the difficulties of which must in no way be blinked, is, in truth, no less easily dis-

posed of, though it has at first a very formidable look. We are asked what we can say in explanation of the petty cares, the tedious weariness, the cruel sufferings from gnawing pain, or, worse, from inconsolable grief and from terrible moral evil? The world not only suffers, but has suffered for millions of years ere man was. For untold ages bloodthirsty rapine has raged and reigned, and cries of pain, due to cruel wounds and to limbs crushed in blood-stained jaws, have continually resounded in the only one of God's worlds we are able to know and understand. The very existence of many creatures is bound up with the sufferings of others, and parasites, external and internal, torture their helpless and involuntary hosts by means of implements carefully contrived for securing their hold and aiding their progress.

The reply to this objection needs to be divided under two heads. Under the first we will consider the evils of life as far as regards man, and subsequently we will consider them as affecting all other sentient organisms.

First, with respect to the world and man, we may ask our dissatisfied opponents what they would have. Would they have (1) a system of things in which there were no painful or destructive agencies, or (2) a system in which pain and suffering should be dealt out to each man with full justice, exactly according to his deserts?

To those who might choose the former alternative it may be replied, in the first place, that the whole course of nature would have to be altered to effect it. The storms and other violent commotions of air and ocean have their beneficent as well as their destructive effects, and the circulation of these elements is closely connected with the maintenance of vegetation and animal life, and therefore with the life of man. No one pretends that God can do what is absurd or contradictory, and the range of objective contradiction may be much more extensive than is commonly supposed. God cannot make a circular triangle or cause an event now passed, never to have happened; for such things are contradictions, and therefore nonentities which can have no relation to Omnipotence. But how many objective contradictions which are beyond our know-

ledge may render really irrational, and therefore impossible to God, actions which to us may seem likely to open out short cuts and easy roads to perfection? We have already seen that God cannot make all things which are separately * possible to be actual simultaneously—not all things which are possible can possibly co-exist. There may thus be inherent absurdity and contradiction in the notion that all that makes life best worth living could have existed in a material universe devoid of any kind of hurtful or destructive activity—in a world in which water should not drown, or any action of the sun's rays or any climatic conditions tend to injure health or destroy life. What would be the social, intellectual, and moral condition of a population, no member of which, whatever he did, could possibly hurt himself? What progress in the arts of life would be made were hunger and thirst either never felt or always to be assuaged without any inconvenient effort; were shelter from bad weather never needed, and were no sanitary conditions required for long and healthy life? But the loss we should suffer from the absence of all life's trials would be inexpressibly worse than a mere deprivation of some material goods; our moral loss would be incalculable. Is it not the very difficulties and dangers of the world which call forth noble efforts and raise the moral standard of whole populations? As has been well said by Dr. Henry Hayman, "If there was no natural theatre of peril, there could be no natural school of hardihood and courage. To whatever extent, then, these virtues are prized, we must exempt from censure any machinery needed to produce them." Indeed, if all pain and evil disappeared from human life, all that is most lovely would disappear with it. Then there would be no opportunities or occasions for generous self-denial, loving pity, tender compassion, or ardent philanthropic effort. Thus a morality which would begin by abolishing all the physical evils of life would find in the end that it had stultified itself by having thereby abolished that by which its own being was nourished and sustained. Could we, then, afford to lose pain and suffering altogether?

* See above, p. 385.

Let us now consider the other alternative offered by us to the objectors to God's goodness—a system in which full justice, exactly according to his deserts, should be dealt out to each man in this life.

In such a world all pain, suffering, loss, or disaster, would always and everywhere be infallibly withheld from each man according to the degree of his uprightness and virtue. A condition of things more likely to be fatal to all uprightness and virtue it is, we believe, impossible to conceive. As Dr. Hayman has again said, "Human actions being moralized by their motives, the ascendant motive, especially amidst a race so far tainted with selfishness as mankind, would tend to become a selfish craving for personal exemption from loss, damage, disaster, and violent death; this working everywhere, in generation after generation of men, must inevitably result in stamping out all virtuous *principle* among them. . . . Every one would know his own motives and his neighbour's, and each would appraise the others as all working for wages punctually paid in a premium of insurance against all danger or disadvantage." If in every stage of universal society, from the cradle to the grave, nature had stood over us like a hundred-handed Briareus, with a bribe in every hand, ostensibly to promote virtue, virtue would thereby have been poisoned. How, under such circumstances, could any act of generosity or self-sacrifice have been possible? No; it is far better that the crew of a lifeboat should now and then be drowned, than the noble sentiments which make the manning of such a boat so common should be made absolutely impossible to mankind. Fatal to all true nobility of character would such a condition of things indeed be—far more deadly than even the preceding alternative. In a world in which pain and suffering were unknown, there would be no stimulus to virtue, but in one constructed on a system of universal rewards, virtue would be strangled in its birth.

But what need is there that we should wish to abolish all the trials of life, seeing that we have good evidence for the immortality of the soul?* Once grant the ex-

* See below, p. 487.

istence of an all-powerful, all-wise, and all-just God, and justice demands a future life. Therewith it becomes readily conceivable that present sufferings may be hereafter seen by us to have been truly blessings in disguise.

We will now proceed to the second portion of our reply—that which relates to the sufferings of animals. It is indeed quite true that for ages, perhaps for hundreds of millions of years, millions of millions of individual animals have been in a state of unceasing battle, and that teeth, claws, hooks, and suckers have been devoted to the spilling of blood. Yet that very slaughter has had its effects in diminishing the sufferings due to want, disease, and senile decay. The exclamation, "Sharp be the brand and swift the blow, and short the pain to undergo," was no expression of malignity. Moreover, the essence of our suffering is mental, and much of the pain we feel at contemplating animal sufferings is really uncalled for, and due to our tendency to attribute our own feelings and experiences to creatures more or less like us. It is not the sensation pure and simple that so distresses us, but such sensation accompanied by intellectual consciousness and reflection. Only during consciousness does it exist at all, and only in the most highly organized men and women does it attain its acme. Savages seem to have often far less sensitiveness to pain than have cultivated and refined people. The direness of our pain depends on our knowledge of it—the agony of recollecting past moments of suffering and anticipating future ones. Such agony can only exist in a being possessed of a nature like ours, capable of "looking before and after." Moreover our nature, being an intellectual one, enters into and mingles with all the feelings we are conscious of, and therefore we cannot argue with any exactness from our feelings to those of brutes, because we cannot imagine what feelings felt but not consciously perceived can really be. And though, of course, animals *feel*, they do not *know* that they feel, nor can they reflect upon any of the pains they have endured in the past or will have to endure in the future. Associations of sensations they of course have, and sights or sounds associated with previous sufferings

excite fears and prompt to actions which may help them to escape their recurrence. But this is a very different thing from our conscious perceptions and actions, and may be attended with no real suffering whatever. Even as regards physical pain, if the lowest races of men feel it less than we do, how much less may be the physical suffering of even the highest brutes than that of the lowest men? Tears, cries, writhings of body, and contortions of limb, such as are normally in us expressions of suffering, are not necessarily such even in ourselves.* They may be, and often are, the mere accompaniments of reflex nervous action, and may in brutes accompany feelings widely different from our own. Who that has seen how a daddy-long-legs returns again and again to a lighted candle, after first one leg and then another has been burnt in the flame, can think that the creature really suffers? And if this spectacle does not suffice to console the compassionate observer, let him reflect that if a wasp, when enjoying a meal of honey, has its slender waist suddenly severed and its whole abdomen cut away, it does not allow such a trifle to interrupt for a moment its pleasurable repast, but it continues to rapidly devour the luscious food, the pleasure of consuming which is prolonged by the fact that there can be no satiety, the honey escaping at the aperture made as fast as it is consumed.

But there is a strong disposition amongst ourselves ungratefully to overlook the unobtrusive pleasures which continually attend our normal conditions of life. Unimpeded, healthy respiration and digestion, and the quiet sensations of easy bodily repose, are all pleasurable in their way. Still more so, after due rest, are various exercises voluntarily undertaken, often for the mere sake of the pleasurable feelings they impart (as, for example, all forms of sport); and highly pleasurable is the consumption of food when due activity has produced a keen, healthy appetite for it. Pleasures of this nature fall constantly to the lot of the overwhelming majority of animals. Pleasurable also to us is the voluntary exercise of our intellectual faculties, and especially pleasurable are the emotions of

* See above, p. 167.

friendship and family affection. Even small pains and impediments generally give rise to pleasurable feelings of successful effort and obstacles overcome, and very commonly painful experiences are benevolent warnings, tending to save us from more serious evils. Death is inevitable, but it is very often painless, and the majority even of mankind leave life as unconsciously as they enter upon it. Deducting from these experiences such as are due to the presence of intellect, the rest are in various degrees the common property of the whole of sentient nature, which is thus the theatre of constantly and universally exercised pleasurable activities.

But the very force of the objection we are considering lies in the fact of our faculties telling us that goodness is the highest aim conceivable by us—an aim to the promotion of which we have to make every other consideration subordinate. Moral action also can, so far as our own experience goes, be exerted by no being visible to us but ourselves. The moral activity and advance of mankind is, then, the highest object of attainment perceptible to us. Now, the world is so ordered * as to serve most what is highest, while the lower exists for the sake of what is superior to it—man receiving incalculably more service from the world about him than any other organism receives. But man's moral development is impossible without the discipline of suffering, and being, as he is, a creature made up of a spiritual and a material nature absolutely blended in one unity, his mental suffering could not be altogether disassociated from physical pain. Therefore, without the latter, he could not experience a condition absolutely necessary, in the world as we know it, for the attainment of the highest product of which we can conceive this planet to be the theatre. But man is an animal intimately related physically to his merely sentient fellow-creatures whose mode of life his organism fully shares in, even if his body has not a genetic relation with theirs. It could not, then, well be anticipated that physical pain should be exclusively his, and entirely absent from the lives of all other animals whatever, even if it would be (and, to say the least, it is

* See below, pp. 493, 494.

by no means clear it would be) a real advantage to them. On the other hand, could we expect not to be exposed to accidents which may happen to other organisms? Some persons find it difficult to understand how a good God could allow that children should be born malformed, or otherwise physically defective. But such things are but accidents which happen before birth, and what reason is there why accidents should not take place before birth as well as after? That pregnancy should ensure a miraculous averting of evils, would be a very anomalous arrangement of events. Only in a world constituted as is the world we know, could a nature such as we know man's to be, find suitable conditions for its moral advance. So to modify nature so as to meet the wishes of those persons who complain that nature as it is is immoral, would destroy the only real morality of which we know the world to be capable. To "moralize" (in their sense) nature—to abolish suffering, or to make it only fall on evildoers—would be to necessarily demoralize man; and thus the only adequate final end perceptible by us in nature would thereby be utterly defeated.

But were we to grant, for argument's sake, that the phenomena of the world are difficult to reconcile with the existence of an all-wise and benevolent Creator, does it for a moment follow that they are irreconcilable in fact? How minute a fragment of the universe is open to our ken, and how imperfect is our apprehension of even that! May it not well be that pure benevolence, and nothing else, has dictated the laws of the inorganic and organic worlds, and may there not be beneficent ends we do not see, which may be attained in ways we do not understand? Surely it requires no great amount of humility to admit this.

Possibility of inscrutable purposes.

We may, however, go further. We know that human eyes and ears cannot perceive all that is really audible and perceptible, and that there are rays of light and waves of sound which are invisible and inaudible to us, though they may be, and probably are, appreciated by some other organisms. Beyond this knowledge, we may reasonably suspect that material objects have some qualities which

we have not the requisite organs to cognize; we may suspect, that is, that there may be other senses which, though conceivable, are unimaginable to us. We might, for example, have sense-organs revealing to us the chemical or magnetic states of bodies, and probably other states of which we know no more as yet than was known of magnetism when the first settlers took up their abode on the banks of the freshly-discovered Nile. There may be whole orders of existence of which we have no cognizance; and our world, and what is called interstellar space, may be full of entities of various kinds, which are related to the material world our senses reveal to us, just as lines of cleavage are related to lines of stratification. It has been suggested that to electricity, a metal rod might seem to be a hole, or rather, an empty channel, down which it could pour itself; and, similarly, in what seem to us all but emptiness, there may be abundance of different kinds of existences. The reader must not for a moment imagine that we confound what is merely possible with what we know to be actual, or that we would seek to ground upon such a mere "may be" a belief that such things really "are." These ideas are but suggestions thrown out for the purpose of showing how little need there is to doubt of the validity of the arguments which prove to us the existence of Almighty God. But there is yet another very important consideration. If nature can but be so very imperfectly apprehended by us, and if such generally undreamed-of possibilities lie hidden within it, how infinitely inscrutable must be the purposes of the Author of Nature! We see clearly, indeed, that necessary truths are necessary even to Omnipotence, and that to do what is contradictory is impossible to Him—otherwise we know nothing, and fall into utter and absolute scepticism. We see, therefore, that what is good, is good, and that He could neither enjoin or do anything which is not absolutely moral. But can we be sure, when we reflect how imperfectly we know the possibilities of even sense-perception, that there may not be categories of being absolutely inconceivable to us, but in view of which God acts? We know that goodness is *our* highest aim, the one great object of *our* existence; we are enabled to

perceive and conceive all that is necessary to enable us to attain that end; but just as we are not enabled to experience sensations which are not needed for our bodily life, and which, therefore, remain hidden from us, so we may not be furnished with conceptions which are not needed for our mental and moral life, and which therefore remain hidden from us. But because goodness is our highest aim and the great object of our existence, it is not evidently impossible that God may not have aims and objects—utterly inconceivable to us—as much above and beyond "goodness" as "goodness" is above and beyond "pleasurableness." But this possibility in no way involves any scepticism as to the objectivity of goodness and its supremacy for us. Whatever inconceivable aims and objects God may have in view, they cannot contradict the dictates of morality, otherwise goodness would not be goodness. Such aims can in no way conflict with or really defeat morality, but only go immeasurably beyond it, and this may cause moral ends to be wrought out in ways which are puzzling to us. Any inconceivably great end pursued by Him, might cause minor ends (which are *to us* supreme ones) not to be fulfilled in the same way as they would be if such minor ends had been His main end. When these ultimate considerations are added to those before presented for the reader's consideration, there would seem to be absolutely no need to doubt about the goodness of the First Cause on account of the evils present in the world. We may compare the discords of life to the jarring sounds of an orchestra when tuning, before the performance of some masterpiece which is to follow. The discords are discords, but they have their utility and their explanation in the after-harmony to which they minister. With respect to us, the instruments need to be set in order now, and life may be compared with a brief time allowed us for catching the leader's key-note, and setting every string entrusted to us in harmony therewith. Our perception of the facts that an immortal future is in store for us, and that morality, and therefore justice, governs that future, should be ample consolation for all the ills that flesh is heir to. Not only will there be compensation for every evil, but, proper endurance

of evil being found to be the cause of a much greater good, every one, when all is known, will be thankful for having had to endure such trials as fell to his lot, and past suffering will be better than undone.

Seemingly unworthy creations.

We may next consider the objection drawn from the existence in nature of created objects which seem unworthy of an all-perfect Creator or First Cause. How, it is asked, can there be such instincts as those which prompt working-bees to kill drones, some kinds of ants to enslave others, and cuckoos to lay their eggs as they do—their young when hatched brutally throwing out, to die miserably, the rightful tenants of the nest? How can some animals be led to perform filthy actions, and how can it be that some plants present obscene images to our eyes? How, again, can some creatures have parts which are utterly useless—rudimentary organs—such as the minute, functionless wings of the New Zealand Apteryx, and the fœtal teeth of whalebone whales, which teeth are never destined to cut the gum?

Now, the answer to this objection is essentially the same as the answer before given * to those who would deny objective beauty to things which are disgusting to us men. We reply by pointing out how utterly unreasonable it is to apply the standard of human feeling to matters beyond its scope. By this it is not meant to object against our judging all things by human reason, for of course we can judge in no other way. It is only meant to affirm what is undeniably true, namely, that men are apt to judge without allowing for, and trying to abstract from, our specially human sympathies and our merely animal feelings, as distinguished from the judgments of pure reason. We have already considered how actions may be materially moral yet formally † immoral (as an act of kindness done for a base end), or materially immoral yet formally moral (as when an act really wrong is done under a mistaken belief that it is right). Creatures which have not a moral nature at all, can, of course, do nothing either "moral" or "immoral"—their actions are simply "unmoral." Thus ants that make slaves, drone-killing

* See above, p. 259. † See above, p. 249.

bees, cuckoos, and insects which lay their eggs inside other insects, do nothing *wrong*. Nor is there anything really cruel in the bloodthirstiness of a tiger, or really impure in the apparent lasciviousness of an ape. Looking at such actions, as we must, with human eyes and imaginations, we cannot help contemplating them with horror or disgust, because of their unconscious association by us with analogous imaginary *human* actions which, did they take place, would be the expression of the last degree of vileness, filthiness, or cruelty. In the brutes themselves, however, they cannot be either vile, filthy, or cruel, seeing they are performed necessarily, and all actions are blameless which are performed without freedom of volition. Nothing can be really immoral which is not done against the light of reason and with the consent of the will.

It is this which causes a difficulty to exist in some persons' minds in believing certain productions to be expressly willed by the First Cause, because such persons unconsciously attribute to that Cause the human point of view. The structure of certain parts of some of the apes, both of the old and the new world, and the forms assumed by certain fungi of the genus *Phallus*, may serve as examples. But the feelings which arise in us when we behold such objects are essentially human, and *human only*. In themselves such objects are absolutely indifferent, save in so far as they duly carry out the functions of life, and possess an intrinsic harmony and beauty to which prejudice may blind our eyes. An unprejudiced intellect has no difficulty in perceiving that what is disgusting to us may really be most admirable. Thus, if volition rightly directed is—as our moral intuitions tell us it is—the most admirable thing in man, then a filthy mendicant, loathsome with cutaneous disease and as intolerable to smell as to sight, may be one of the noblest and most glorious objects presented by the whole world to its Divine Author, and pure intelligences might turn away with indifference from what men most admire, in order to contemplate so admirable a spectacle. As to rudimentary structures, we may content ourselves with asking, in the words of Buffon, "Why is it to be considered so necessary that every part in an indi-

vidual should be useful to the other parts, and to the whole animal? Should it not be enough that they do not injure each other, nor stand in the way of each other's fair development?" Moreover, such rudimentary structures may have a certain utility, may aid the physiological balance of the organism after all! It cannot yet be shown to be so, but neither can it be shown that it is not so. They are parts of a great whole which, to be adequately understood, must be surveyed in its entirety. But any one of us can as little judge the scope of the whole universe, as a fly perched on a pinnacle of York Minster can perceive the plan, pressures, and bearings of the stones of that glorious pile.

Anthropomorphism.

The answer we have made to this objection leads us to, and at first may seem to justify, the next one—namely, the objection often made to the conception of the First Cause as a personal God, on account of what is called its "anthropomorphism." Such an idea is said to be really the idea of a great ghost—a Brocken-spectre which, in fact, is only our own shadow magnified on the clouds of the imagination and taken for a reality. Man, it is said, always worships an imagined reflection of himself.

In estimating the value of this objection, let the reader ask himself the following questions: (1) Can we think at all except in human terms? Can any man think of anything in any other way? (2) If we are to think of a First Cause at all, is it to be thought of as *more*, or *less* than man? Evidently we cannot think that the First Cause is actually man. (3) If the First Cause is to be conceived of as being *more* than man (as superhuman), must not human perfection be taken as our one symbol of it—since we have no other? (4) Can it be reasonably affirmed that so to act is to mislead ourselves or others, when it is expressly declared that such symbols are *utterly inadequate*, and only used because we can get no better?

The necessity of our nature requires us to use some terms whereby to denote any object of our thought. If we use the highest we have, we thereby include all we can include, while at the same time we do not exclude higher, unimaginable attributes, since we expressly deny the suffi-

ciency of the only terms we can attain to. If we refuse to think of the First Cause in human terms, then we have but the animal, vegetal, and inorganic worlds from which to make our choice. We are thus reduced to think of it in lower terms, and at the best we are reduced to zoomorphism in place of anthropomorphism, which is manifestly altogether absurd. Surely the rational method is to employ the highest conceptions we can, while freely acknowledging their utter inadequacy. After exhausting ingenuity in seeking to find the loftiest possible conceptions, we must regard them as being only accommodations to human infirmity. We may own that they are in a sense objectively false—because of their inadequacy—though subjectively and very practically true. We must, of course, be careful to remove from our conception, all the imperfections we can remove from it, and to regard whatever is positive in our conceptions about the First Cause as being in reality infinitely greater and higher than anything we can ourselves in thought attain to—as far above mind as mind is above matter. And thus, in spite of the necessary limitations of human thought, our highest conceptions do indeed rather merit to be called theomorphic than anthropomorphic. For reason shows us, as we have seen, that a reason, not our own, pervades the whole of nature. It thus shows us that our reason is but an image or fragment (so to speak) of that universal reason impressed on nature, and whence our own reason must be itself derived. Our reason has, therefore, been created in the image and likeness of that reason which is divine, and thus a profound contemplation of the universe in its immeasurable abysses of extension and duration should lead us reverently to exclaim, "*Signatum est super nos lumen vultûs tui Domine!*"

Those men of science who object to what they call anthropomorphism, forget that physical science itself is full of the very same thing. We must always remain men and have human conceptions of all the things which we conceive of.

Reason, then, shows us that inadequate as must be all our ideas of God, they are not on that account deceitful. Reason compels us to affirm as existing in God, attributes

analogous to the highest qualities we know to exist in man. Inadequate as such affirmations must necessarily be, it is none the less certain that they are truth itself as compared with the absolute negation of such attributes. The term "good" as applied to God is immeasurably inadequate, but it is infinitely truer than its opposite. Therefore to call Him "good" is neither false nor unmeaning. Nevertheless, the disparity being infinite, no term whatever, not even "existence," can be applied in the very same sense to God and to any creature; "existence" in God and créatures being indescribably and incomprehensibly different. Yet there is a true analogy, and the feeble dependent being of the very lowest creature is an inconceivably distant shadow of His absolute and necessary existence—*à fortiori*, such is that of a creature like man, capable in a manner of knowing God, and of recognizing and obeying His ethical behests. Thus to call God "good," is to say what is most true, though quite inadequate. Instead, then, of vainly striving to think and express thoughts which are absolutely above our capacity, the only reasonable course for us is (as before said) to use our utmost ingenuity in striving to arrive at the very highest conceptions and terms we can, and then recognize at once both their truth and their inadequacy. They are only, in any sense, objectively false, because, as compared with their object, they are utterly inadequate, being infinitely below the truth, while in another sense they are perfectly true, being the most complete representations of the truth possible to us. There is a vast difference, indeed, between this view and a simple denial that God possesses attributes which are analogous to human qualities. That denial is practically atheism. But the assertion here made only maintains that our conceptions err in not being *true enough*, *i.e.* in their necessary impotence to attain to the comprehension of an inconceivable reality which, nevertheless, really *is* all that can be conceived, plus an inconceivable infinity beyond.

We can thus see how well the universe about us corresponds with what we might expect to find in the production of an Infinite Being thus partly known, while yet

remaining incomprehensible and altogether shrouded from our direct gaze. The ways of such a Being cannot evidently be as our ways, or His works such as we might imagine ours would be were we God. And we find everywhere immanent in nature an activity which harmonizes with this view and may be rationally accepted as being from God. In the universe, as we before said, we everywhere find an action the results of which, as a whole, harmonize with man's reason—an action which is orderly and not fortuitous, while at the same time it is unlike human action.

Another consideration is of great importance to us. This is that we need no longer scruple to freely use and apply our human phraseology in speaking of the First Cause, provided we constantly keep its infinite inadequacy in view. Our answer to the objection againt anthropomorphism has done us this great service. Thus, in the first place, with respect to the term "personality," seeing that all which is positive in it absolutely applies to God, we may freely use it, recognizing at the same time that it is infinitely beneath Him. It was this recognition of its inadequacy which gave rise to the term *Hyperhypostasis* to denote this supreme Personality, and thereby distinguish it from every personality which is subordinate and dependent upon His. And as we may, with this proviso, speak of the First Cause as personal, so we may similarly speak of His intelligence, attention, volition, complacency, and love. But we must, of course, remember that the inadequacy of every assertion made with respect to God is so great, and the difference, for example, between God's so-called "attention" and anything we can conceive is so infinite, that it would be correct to deny such "attention," were not the denial an inconceivably greater error than is that involved in its assertion. God attends to everything in a supereminent way—because He really co-operates in every action in nature, the whole of which is constantly sustained, as it is pervaded, by Him in whom we live and move and are. God is thus neither withdrawn from, nor identified with, His material creation, and no part of it is left devoid of meaning or of purpose.

The poet's complaint about the flower, "born to blush

unseen, and waste its sweetness on the desert air," is thus manifestly quite a mistaken one, since every creature of each order of existence is ever, while its existence is sustained, so complacently contemplated by God that the intense and concentrated attention of all men of science together upon it could form but an utterly inadequate image of the intensity of such Divine contemplation. It is, in fact, an inveterate anthropomorphism adhering to those very men who loudly object to anthropomorphism which makes them blind to such evident inferences as these. They have a sort of feeling that a First Cause must get tired, or weary, or sick of such continued incessant attention to every detail of every form of activity throughout the universe. But because it is a necessary consequence of our anatomical structure that our nerves should be unable to feel even the most pleasurable sensations beyond a limited time, and that our brain cells should be inadequate to continue indefinitely the supply of images needful for thought without the intervention of periods of rest, it by no means follows that even a created immaterial intelligence could not continue incessantly active, and a moment's thought shows the utter absurdity of such imaginations with respect to the First Cause. That Cause concurs and must concur by His action in every natural phenomenon, and has an infinite complacency in each. But there is a due, because rational, order in such complacency; and since we see clearly that "goodness" is the highest of all qualities conceivable by us, an important consequence follows. Let us endeavour to bring home to our minds the fact that the existence of a countless multitude of actions and interactions is revealed to us in every department of science. Let us consider the series of such in the physical, chemical, and biological sciences, in the economical and political progress of mankind, the manifestations of art in all its branches, the struggles and migrations of tribes and nations, and the rise and fall of states. Let us contemplate the physical possibilities of existences of different kinds in the vast fields of interstellar space, receding from us on all sides into unfathomable abysses and for incalculable ages, and then try to realize the thought that the

Divine complacency in all such physical phenomena is as nothing compared with that complacency with which He regards one single act of man's free-will directed in harmony with a moral perception, even though it be a mistaken one. If, then, this reasoning is valid, the last and highest lesson which nature (considered as a whole, *i.e.* as both rational and sentient) teaches us, is that the great First Cause has attributes of such a kind that the terms "power," "knowledge," "goodness," "purpose," and "will," are those least inadequate to convey to our minds a practically true conception and belief concerning them. Of such a Cause the word "personality," in a similarly analogous sense, can not only be fitly used, but must be positively affirmed, since not to affirm it is in fact (1) to deny to the First Cause the necessary adequacy for producing the effects we see, and (2) to endeavour to degrade Him to an order of existence lower than that of man himself. In a word, then, this objection of those who profess to object to all anthropomorphism only serves to bring out into more distinct recognition the fact that we (and all we see around us) have for our origin, our sustentation, and our end, one only Being possessed of Personality in the highest conceivable degree —God.

God's existence and creating power.

The next and last objection which it seems needful to consider is that made to certain consequences attending a belief in an act of creation, both as to the idea and as to the mode in which it has, if at all, been effected. It is affirmed (1) that the conception of a past eternity when God alone existed, is repugnant to the mind, and that were creation conceived to have taken place, we should thereby destroy our very idea of God, both by (2) dividing His existence into that before and that after creation and (3) by limiting Him by the conception of a universe existing in addition to Him. Lastly (4) it is objected that a slow process of formation, such as science exhibits to us, is a process unworthy of the providence of God.

With respect to any repugnance which may be felt at the idea of God existing for an eternity by Himself, our utter impotence to conceive in the faintest way what He is in His own Essence is enough to show that the objection

has nothing positive in it. Judging even by that remote analogy through which we can, as we have seen, to a certain extent know God, it is a trivial objection. For any man living in the possession, to his utmost capacity, of whatever was most desirable for him and whatever he could himself desire, must have a perfect existence. But God possesses, and must possess, this in and by His Own Eternal Being. The thought of God's existence by Himself is necessarily accompanied by an imagination of a "time" when nothing existed but God; but such "time" never was nor could be. There never was a time when God was thus in solitary Being, for time is, as we have seen,* but an abstraction of an abstraction drawn from succeeding things, and till such things were created there could have been no "time."

The same consideration will also serve to do away with the supposition that the idea of creation conflicts with our idea of God's nature, by dividing His unchanging, eternal existence into two eternities, one before and one after creation. This objection reposes upon a similar fallacy of the imagination. Time being merely an abstraction from created things which succeed one another, does not, and cannot, apply to God, with whom there is no past or future, and two eternities are no more than one. We cannot, of course, think of the Divine duration without the presence in the mind of a misleading image of succession; but our intellect can perceive, by reflection, that such duration signifies the most complete positive existence, accompanied by an entire absence of all succession or change. The idea of such an existence we can give expression to, and therefore, evidently, we can conceive of it, though, of course, we can never imagine it. We can express it by a simultaneous affirmation of existence and negation of change.

The next objection made is the assertion: God could never have created the universe, for if He had He would thereby have ceased to be God, since God would then have become limited by what He had Himself created. This objection also reposes on a misleading trick of the imagination, parallel to its misleading action with respect to

* See above, p. 409.

"time," which was at the root of the objection last noticed. God's existence is not only unimaginable, but absolutely inconceivable to us, as it is. Nevertheless, our intellect can, by reflection, apprehend it to a certain extent, and can to such extent express it. We can express it by a simultaneous affirmation of ubiquity and negation of limitation. God's existence we can recognize as being absolute and necessary; every other existence being necessarily relative and contingent. But these two orders of existence are absolutely different, and one can infinitely less limit the other than the quality of the paper on which a musical score is printed can limit the resonance of the brass instruments engaged in its performance. We have recently spoken of the creations of art.* It is evident that the poet or the sculptor does not become limited by his creations, or the more limited the more they are copied and reproduced. All such considerations, however, are, of course, utterly unable to convey to our minds any adequate notion of the absence from God of any approach to limitation by the creatures He has produced.

Difficulty from tardiness.

The last objection to be here noticed is that which has been sometimes made to the process of creation, and is the most trivial of all. It affirms that the slowness of the process is unworthy of the Providence of God. It is truly enough said that the evils of a temporary condition of things do not cease to be evils because they gradually improve, and improved conditions can be no good to beings which came into existence before such ameliorations occurred—while the grass grows the steed starves. But this objection really amounts to the implied assertion that God was bound to have created, with absolute instantaneousness, what might seem to us to be "the best of all possible worlds," since, if God could be reasonably blamed for not acting in a way which seems to us "quick" and "uninterrupted," He could be blamed for any delay at all, however small. But we have already seen that pain and evil could not well be spared in a world which was to be the theatre of moral energies, and we have also recognized our utter inability to comprehend the ultimate purpose of creation, which, in spite

* See above, p. 464.

of its apparent imperfections, may (as God sees it, and with His ultimate aims, which are necessarily unfathomable by us) be really a creation which in all its parts is constructed as is truly best, and if so, then we may be no less sure that the rate of its progress is the rate which is also that which is really best. If changes which are instantaneous or sudden seem an adumbration of God's power, the secular evolution of the universe through unimaginable ages may equally shadow forth His eternity.

A future life and theism.

Another question now demands consideration in terminating this review of difficulties. The objection to a course of events producing a gradual amelioration in the conditions of life would be a valid objection if the generations of men which pass away before such ameliorations arise, could not count upon abundant compensations in a future life. That a belief in such a continued existence for human beings is demanded to vindicate God's goodness, has already been not only admitted, but asserted,* and our immortality is really implied in our moral intuitions, which also constitute one of our strongest arguments for the necessity of God's existence. Our ethical perceptions are as absolute and certain as any we have, and the very existence of a moral law for us supposes the existence also of some power on our parts of doing something in obedience thereto. Now, duty is a command which is supremely authoritative, without being arbitrary. It is recognized by our intellect as being reasonable and worthy of our respect and obedience. We see clearly that no human ordinance can possibly dispense us from it. It remains inviolable and immutable in itself, however much it may be outraged or neglected. We see clearly that it is at once both necessary and universal, and applicable to all times as well as to all places. But this law which thus imposes itself on our intellect with the authority of an eternal truth, and which commands our will with the most supreme authority, and which no human act can change, cannot have man for its origin or principle. Supremely reasonable itself, it supposes a supremely reasonable Cause; absolutely good, it supposes an absolutely good Cause;

* See above, p. 471.

invincible in its power of command, it supposes an invincible Cause. It supposes, then, a Cause which can be no other than God, supreme in power, wisdom, and goodness, whose goodness does not depend on His will, but is of His essence. God is a moral Being, or He is God only in name. As Malebranche has well said,* "He who should prefer that there should be no God, rather than a God who pleased Himself by rendering eternally miserable those who truly love order, reason, and justice, is a just man. For a God who is capricious, unjust, or cruel, is not a being to be loved, but a frightful spectre."

Thus these three truths (our moral freedom, the moral law, and the existence of a Divine First Cause) are connected together by the closest and most solid bonds. They are also closely bound up with a belief in our continued existence after death. Men, as moral agents, are free, and are also provided with an authoritative moral code derived from the essential nature of an absolutely good God; its behests being shown to them in concrete cases by their reason. Such agents must differ in character according as they obey or disobey the code for the observance of which they are (in most varied degrees) responsible. But every responsible person may be called to account—has an account to give—concerning that for which he is responsible. If he has acted well, he must have acquired merit, and has a claim to approbation. If he has acted ill, he must have acquired demerit, and deserves disapprobation. The agent who has employed his freedom in doing what is right has manifestly gained in value, in dignity, and in excellence; and he who has done the reverse has manifestly lost in value, dignity, and excellence. Now, justice demands that each man should be treated exactly according to his deserts—that happiness should, at least ultimately, attend on virtue, and unhappiness on vice. The practice of virtue often necessitates cruel sacrifices; yet justice imperatively demands that happiness should not be finally divorced from virtue. Hence follows the moral necessity for us of a future existence, since perfect justice is not accorded to men in the present

* See also Mill, as quoted above, p. 246.

life. As John Stuart Mill has said * with respect to this matter, and referring to an ideal world where justice was accurately carried out, "No one is able to blind himself to the fact that the world we live in is totally different from this."

Ancient literature, sacred and profane, teems with protests against the successful evil-doer, and history affords a multitude of instances of the imperfect distribution of justice here, although roughly and on the whole honesty is no doubt the best policy. Let it be granted that Louis the Sixteenth of France and his queen had all the faults attributed to them by the most hostile of serious historians; let all the excuses possible be made for Louis the Fifteenth and Madame de Pompadour—will any one affirm that the vices of the two former so far exceeded those of the latter that their respective fates were according to their respective merits and demerits? What, also, could be said with respect to Louis the Sixteenth's unfortunate son, who perished so miserably in his afflicted childhood?

It is duty which should rule our present life; but that very duty gives rise to hope—the hope of a future life where justice will be fully satisfied, and, together with justice, the deepest and most vivid aspirations of our better nature. At the same time it gives us to understand that the only recompense worthy of virtue is the possession of what is most truly good, just as the only punishment worthy of vice is the loss of that same good. But who can fulfil that expectation of the enlightened conscience or discern our true merits and demerits, but an infallible judge of conscience, one who has boundless wisdom, and who is both absolutely just and irresistible in power? It must be He whose possession can be for the soul its supreme good, and whose loss must therefore be its supreme ill. It must be a First Cause who, being the Author of human nature, alone absolutely understands it. It must be God, the supreme legislator, judge, rewarder, and chastiser.

The truth that God exists is thus evident to whoever really understands the idea of duty, and will be the more evident the more that idea, together with the circumstances

* In his "Three Essays on Religion," 2nd edit., 1874, p. 38.

of human life, are understood. It is the very fundamental truth of the whole moral order, the one which sustains all the others, while they in turn serve to make clear to us the existence of the great truth which supports them. Our perception of our own freedom and of the moral law indicate to us their own foundation and the principle of their being—God; and these together demand a recognition of the fact that death, which puts an end to our apparent existence, is not really a termination to our conscious being. We have already seen * that the nature of our intelligence, which is capable of reflecting on itself, and can unite past, present, and future in one thought, and can intervene in the chain of physical causation by its free volition, affords a reason for concluding that, as a simple substance, it will persist and survive. Considerations of justice and the proofs of the existence of God, complete the proof of the soul's immortality, and there are no serious reasons whatever against its possible survival. The last refinements of physical science do not add one iota to the arguments urged of old against our immortality. It was known centuries ago that "when the brain was out the man would die and there an end," as regards the life in the body; and we absolutely know no more now. We cannot *imagine* the soul's existence after death, but imagination is not reason; and our inability to picture a thing to the mind is no reason whatever for our not believing anything which positive arguments render credible. Because acts of intellect as we experience them, will cease at death, it does not follow that they will not persist in any form at all. We have thus no real argument whatever against a belief which has evidence in its favour so strong, that to disbelieve it logically involves a disbelief in God, free-will, and morality, and thus involves absolute scepticism and complete intellectual paralysis, which those who deny it only escape through a voluntary or involuntary neglect to follow out principles to their rational and ultimate conclusions.

That the fact of the soul's immortality is not more obtrusively evident is of enormous advantage to morality

and to us men. If, instead of dwelling in what may be termed an intellectual twilight, it was as evident to us as are the faces of our friends, generous devotion and all self-denial would be almost impossible to us on account of the certainty we should have about future rewards and punishments. The same consideration applies also to our practical apprehension of God's existence. If His Being and Majesty could not be ignored by us, the most selfish motives would conspire with better ones to prompt us to actions materially virtuous but sadly deficient in formal goodness. Only by ignorance in these respects can we become worthy to participate in the greatest good.

God has been more gracious and merciful to us than to make the evidence of His existence so plain that its non-recognition is a mark of intellectual incapacity. Certain and irrefutable as are the proofs of His Being, yet conviction on the subject is not actually forced upon men as is the conviction of the existence of the sun at noonday. God will not allow Himself to be caught at the bottom of any man's crucible, and He is too benevolent to yield Himself to the experiments of ill-intentioned or irreverent inquirers, who would only draw down additional misery on themselves by a revelation which they were permitted to extort at will, without any regard to their state of preparedness for its reception.

Recapitulation.

It may be well now briefly to relate the conclusion at which, in this chapter, we seem so far to have arrived.

The universe, with its complex constitution, not containing within itself a sufficient reason for its existence (which cannot be the result of selection), demands a distinct external most potent First Cause, and one adequate to produce all the effects which we know to exist, and therefore itself possessing intelligence, goodness, and volition. From a consideration of the powers of the human soul, combined with the conditions of human life and the existence of a Divine First Cause, reasons have been advanced to show that death cannot be held to terminate our existence—that the mortality of the body does not terminate the life of a soul possessing reflective, conscious intelligence and free-will. But we see about us a multitude of living

organic bodies (animals) which are devoid of such an intelligence, while in ourselves we know bodies which possess this intelligence. From the conviction that a future life attends us after the death of the body, there follows a necessary conviction that conscious intelligence can exist without bodies, and therefore, since we know there are such multitudes of living bodies which never had a conscious intelligence, we must admit it to be possible that there may be multitudes of intelligences which never had a body.

Final causes.

The existence of a First Cause having amongst its attributes a power, intelligence, goodness, and volition, such as find their faint and inadequate types in our own faculties, necessarily involves a second kind of causation. It must, as "will," have an intensity of purpose such that no human purpose can be comparable with it. Hence follows the second kind of causation referred to, namely, *final causation.* An examination into final causes may supply us with the last answer possible to the initial question of this chapter —"*why* things are?" Such a causation and the existence of an end and purpose in the Divine mind have been necessarily adverted to already—especially in our consideration of the objection which has been made to theism on the ground of the evils which exist everywhere in irrational nature and in human life. Our task now must be to seek out, in the first place, indications of final causation in the phenomena of the material universe itself. Subsequently we must consider how far we may venture to affirm and define the purposes of the Creator on the strength of principles intuitively seen, and evident to that human intellect which (as possessed of the knowledge of some universal and necessary truths) declares itself to have been made a partaker, in however remote and fragmentary a degree, in the light of that Divine Intelligence it has been formed obscurely to reflect.

Turning our eyes once more downward upon nature, it is impossible to refuse to recognize the fact that it is replete with purpose. In the world of organic life each organism plainly declares that its individual existence is directed to an end, or rather to ends; one being limited to the purposes of its own existence, the other extending to ends beyond

itself. An organism is (as before said) a living whole, the parts of which are each reciprocally ends and means, and all are means to the conservation of that whole. In our survey of the structures and activities of animals and plants, some examples have been given of complex, correlated structures working harmoniously in the performance of functions which prepare the way for future conditions. The whole organism is instinct with an immanent finality and teleology not its own, which penetrates and regulates the inmost recesses of the parenchyma of its structure. Not only every system of organs and every organ, but every cell and the constituent parts of every cell, in fulfilling the evolution of its own being and perfection, contributes its quota to the predetermined perfection of the one organic whole. We have seen also that every organism bears essential relations both to the past and to the future, its whole existence being made up of a series of modifications tending to the completion of a cycle of changes. The phenomena which attend the development of the adult from the germ, most plainly announce their teleological character. As Claude Bernard has said, in every living germ there is a directing idea which develops and manifests itself in and by that germ's gradual organization. But the phenomena of instinct are perhaps the most noteworthy of all, and these will be shown in the next chapter to be quite inexplicable by accidental variations, naturally selected.

Many of the more noteworthy instincts lead us from manifestations of purpose directed to the maintenance of the individual, to no less plain manifestations of a purpose directed to the preservation of the race. But a careful study of the interrelations and interdependencies which exist between the various orders of creatures inhabiting this planet, shows us a yet more noteworthy teleology—the existence of whole orders of such creatures being directed to the service of other orders in various degrees of subordination and augmentation respectively. This study reveals to us, as a fact, the enchainment of all the various orders of creatures in a hierarchy of activities, in harmony with what we might expect to find in a world the outcome of a First Cause possessed of intelligence and will, since it

Hierarchy of ministrations.

exhibits, at the same time, both "continuity" and "purpose." It shows us, indeed, that a successively increasing fulfilment of "purpose" runs through the irrational creation up to man. And thus the study of final causes reveals to us how great is our dignity and consequently our responsibility.

Geology and paleontology show us that a great process of evolution has taken place in the past and is taking place now. In examining the creatures around us we see varying degrees of perfection expressed by the terms "organic" and "inorganic," "animal" and "vegetable existence." Science gives us good grounds for believing that before the world was the theatre of organic life-processes, it had existed as an inorganic mass of highly complex materials, each with its special properties, and that animal life (at least, in all but its lowest forms) was preceded in existence by the kingdom of plants. Certainly we may affirm that all these forms of life—the merely inorganic, the vital, and the sentient—existed for untold ages before the introduction into the world of the self-conscious life of man.

The inorganic world long existed, and could so have persisted indefinitely. It had, and has, no need of living organisms for its being. The vegetable world, which feeds upon inorganic matter, could not exist unless that had preceded it, but might for untold ages, or for ever, have lived and flourished, nourished but by showers and breezes, fertilized but by the wind, with no hum of insects about its inconspicuous flowers, and with no songsters amidst its groves.

The animal world, necessitated ever, directly or indirectly, to feed upon the vegetable world, could not exist without the earth's green, vital, but insentient vesture; yet might for untold ages, or for ever, have lived undominated by the hunter, and with no experience of domestication or any other form of servitude.

Man, though capable of sustaining life on vegetable food alone, could never have attained his high civilization without the aid of his dogs and horses, his flocks and herds. The animal world has been necessary to him, as he is.

Thus an increase of service and a consequently increased dependence are manifest as we ascend through

these degrees of existence. Cosmical entities and their laws serve organic being more than inorganic, sentient being more than insentient, rational being more than sentient. Therefore, as theists, we are logically compelled to affirm that God has evidently willed most service to man of all His earthly creatures. Thus also, as we have just said, a successively increasing purpose runs through the irrational creation up to man. All the lower creatures have ministered to him, and have, as a fact, prepared the way for his existence. Therefore, whatever ends they also serve, they exist especially for him.

Highest purposes.

And what is the end of human life? What final cause may we assign to the existence of a universe of which man forms a part? In the first place, what is the end which nature, by our intellectual intuitions, reveals to us as our proper aim? The rational aim and end of life is that which *should* be its end, *i.e.* which *ought* to be its end; and "ought" is meaningless without the conception of duty. The end of human life, then, is the exercise of will according to the dictates of right reason.

When we consider the facts of human historical progress, we see that it has been a progress from direct and simple apprehensions, to more and more reflex, self-conscious and complex comprehensions—the development of the race repeating that of the individual. The course of human existence, then, has been and is a course tending to afford a constantly increasing field for more and more intelligent and deliberate right volitions, performed by individuals presenting the greatest variety of increasing individual excellencies, and grouped in aggregations tending to manifest higher and higher degrees of beauty, truth, and goodness. When, then, in the unfathomable abyss of past time, the first film of protoplasmic matter appeared in the hot mud of some primeval pool, and when the most undifferentiated and nascent organisms first moved on the waters of some dismal silent morass, preparing the way for the earliest fungoid or algoid existence, one true end of existence for such lowly forms of incipient life, was the fulfilment of the moral law—a fulfilment to be brought about after what seems an eternity to the imagination, but which

reason cannot doubt to have been but in its due time and season.

When we recall to mind what reasons we have for the conviction that this life is not our final life, yet another reason appears why God has made a world which He has so ordered as to serve us above all other creatures. This reason is that the world should serve as a probationary theatre for the activities of immortal human souls.

Goodness being our supreme law and our highest aim, it is impossible to doubt but that goodness has been also the aim of that First Cause in whose image we are made. But we have already seen * that there may possibly be other ends and purposes utterly inscrutable to us. As to such ends it is useless to speculate, especially as we may rest perfectly contented in the assurance that no such ends can really conflict with goodness. But even to our mental vision there are other ends which are dimly conceivable. They are distinct from that end set before us by our ethical intuitions, but though distinct from, they harmonize with, those intuitions—especially the last of those which will be next adverted to.

Since all which exists comes from and is sustained by God, as everything is, so to speak, the work of His hands, it is also, so to speak, the outcome of His intelligence. We recognize in the multitudinous forms of organic and inorganic nature, objective existences which give rise in us to ideal conceptions whereby we may imperfectly comprehend or apprehend them. Sidereal relations, orbital paths, secular refrigerations, depositions of strata, cleavage and metamorphism, physical forces, chemical transformations, afford mental food for many minds which find a special happiness in their study and contemplation. Other persons take more delight in the organic world, and species, families, orders, and classes are for them ideal conceptions full of interest for their minds; but species, genera, etc., have (as have the previously referred to conceptions) another ideal existence also. Every theist must admit that the intellect of God contains all that exists in the human mind, and infinitely more. It is therefore a simple truism to say that human

general conceptions, gathered from nature, must be ideas in the Divine Intellect also—such human conceptions being but faint and obscure adumbrations of corresponding ideas which must exist in their perfection and fulness in the mind of God. But our ideas are ideas derived from material things, while the Divine ideas are ideas whence material things have been themselves derived. Human ideas are true in so far as they correspond with really existing things external to the human mind. But really existing things are themselves "true" in so far as they correspond with the eternal, archetypal, or prototypal ideas of God which are their *exemplar cause.* Thus, all the facts of nature, from inorganic substances and the lowest vegetal and animal forms up to the most complex organizations of human society, have a reason for their existence in that they are external manifestations and embodiments of Divine ideas, and therefore objects of complacent regard to that Divine Being who is their source and life. There may be, as we have just recalled to the reader's mind, also other ends and aims known to God but hidden from us, as different from what we have known as truth, beauty, and goodness, as these are from mechanical motion or chemical affinity. We can but recognize this possibility in silent awe. All speculation is useless, though we may recognize with certainty that such ends cannot contradict the rule of right, or right would cease to be that which it is seen by our intellect evidently to be. We may, however, before concluding, venture to ask whether there is not one more aim and object dimly perceptible to us as a relation between God and His creation apart from our supreme rule of right. God has gradually revealed to man, man's own dignity. Savages hold their humanity in low esteem, and many of them, like some modern sophists, deem the brutes nearly or quite as good as themselves, or even as more highly gifted and meriting worship. It is a question whether the irrational gods of Egypt were not originally, or for a time, much more than symbols. Even Greece and Rome had far less perception of man's dignity than arose in subsequent ages. Modern philosophy (which, as we have seen, brings home to us the altogether distinctive nature

of our powers of intellect and will, compared with the powers of all other organisms) enables us more perfectly than ever before to recognize our dignity and responsibility, while more and more increasing the perception of our utter nothingness compared with God. At the very same time it shows us how true, though remote, is the analogy between that relative nothingness of ours and God Himself. Animated with this reflection, we may look within and venture to apprehend yet another cause and motive—another reason "why"—for the existence of the world through God's creative action. It is a conception which seems to bring to us a ray from God's essence more profound in its source than even the conception of "right." What is that energy in ourselves which makes actual all that is noblest, most self-sacrificing, most tender, yet most energetic and unflinching? What is it which attracts the will towards all that is most beautiful in nature and in art, all that is most admirable in character and conduct? It is that which is expressed by the sweetest yet sublimest of all words, the word which denotes energy in its highest and purest form conceivable by us, namely, "love." It is the "love" whence all love proceeds; which is at once the source as it is the only absolutely fitting object of a love without limits on the part of man; which seems to us to be—though perhaps not the absolutely highest—the highest Divine motive conceivable by us, and, as such, the ultimate reason or "why" of creation, so far as motives and purposes of the Divine First Cause are perceptible to us by means of those certain and evident intuitions through which He has deigned to illuminate the human intellect.

Thus the study of nature in all its forms, inorganic, organic, and rational, is shown by science, or the study of causes, to clearly point to a great First Cause not only adequate to the production of all that It has caused, but inconceivably exceeding all our powers of thought as well as of imagination. Interesting as are the studies of the zoologist, the physiologist, the geographer, the geologist, the astronomer, and the psychologist, they are most interesting to the man of science *par excellence*, that is, the philosopher. The true philosopher will never rest satisfied

with a knowledge of the coexistences and sequences of phenomena, but will ever seek to obtain what glimpses he can of all degrees and orders of causation. Only at last will he rest satisfied, when, having traced as far as he may the series of secondary causes, he is able confidently to refer them to the evident though hidden action of the great Author of nature. Reason exhibits to us the whole cosmos as proceeding from Him, and only when the study of His creatures ends by leading the student back to Him from whom they proceeded, can that study be said to be "rational" in the highest sense of that word. Then only is it truly worthy of that admirable human intellect which sees in the concordance between subjective reason and the rational laws of the objective universe, evidence that the human intellect itself bears a real analogy to, and has been created in the likeness of the intellect of God.

Having thus completed such an examination as we have been able to make of the Cause and reasons for the existence of the universe, we must next proceed to study the mode and process by which the creation has been developed, or evolved, to that degree of harmony and perfection with which it offers itself to our investigations now. Having considered *what* things are and *why* they are, we must next examine *how* they have become what they now are.

CHAPTER XXVII.

EVOLUTION.

The analogy of individual development points to the evolution of species according to definite, preordained laws. The evolution of the world has been brought about by the interaction of immaterial principles, in accordance with Divine appointment, for an end beyond itself and in relation to the moral powers of mankind.

Meaning of the word—Ontogeny and phyllogeny—A familiar example of ontogeny—Other processes—Explanatory cosmical hypotheses—Psychogenesis of the individual—Phyllogenetic hypotheses—Heredity and environment—Action of natural selection—Independent origin of similar structures—Psychogenesis of species—Origin of man—Conclusion as to evolution—Religion and philosophy.

WE may now, in conclusion, consider the question, "How things have become what they are;" * but it has been already recognized † that the physical sciences show the process to have been a gradual one. The word "evolution" has been employed in various senses, but is now generally used to denote that process by which the universe in general, and our world with its inhabitants in particular, are supposed to have grown to be such as now they are. Amongst the facts which point in that direction are, the intimate connection which exists between the physical forces and also the similarity in the chemical composition of cosmical bodies.‡

Meaning of the word.

It is very generally believed that the earth, with its moon and the whole solar system, have been gradually formed either in a manner more or less similar to what

* See above, p. 384. † See above, p. 494. ‡ See above, p. 301.

we have noticed as the nebular theory,* or by some other operation of ordinary physical laws. The general harmony in the movements of our planetary system seem to indicate this.† The world having assumed the form of a separate planet, is further supposed to have gradually cooled, till at last aqueous vapour could become water, and till the various seas, oceans, and rivers, with their waves and currents, could begin their eroding and redepositing action, after which with further cooling and various atmospheric changes, the earth became a possible dwelling-place for organic life. The slow evolution of the present state of our globe is show by its successive strata.‡ Although every experiment which has been made to originate life from non-living matter—even though organic matter—has utterly failed,§ yet it is very generally assumed (and with probable truth) that in some early physical condition of the world, which has not yet been reproduced by experiment, living organisms did spontaneously come into being. The uniformity of nature ‖ compels us to believe, if life ever arose spontaneously through the formation of certain non-living compounds under certain primordial conditions, and if such compounds are formed by us hereafter under conditions sufficiently similar to such primordial conditions, that then life will again spontaneously appear. The hypothesis of spontaneous generation is slightly favoured by the fact that a number of highly complex substances are now produced in our laboratories, which substances long resisted all our attempts at their artificial production, and were therefore supposed to be the products of living beings only. Such substances are *e.g.* lactic acid, indigo, alcohol, and urea. The close connection between the living and non-living worlds is shown by the process of osmosis, and the presence of crystalloids and colloids ¶ in both, and the instability of their nitrogenous compounds.**

If we may conclude that in some earlier stage of the earth's history living creatures appeared spontaneously, we may also conclude that such creatures must have been

* See above, p. 404. † See above, p. 301. ‡ See p. 310.
§ See above, p. 330. ‖ See above, p. 65. ¶ See pp. 159, 305.
** See pp. 306 and 325.

of the simplest kinds. Such earliest organisms are often supposed not to have possessed the power of reproduction, and to have been therefore but imperfect, transitory organisms, which subsequently came to multiply by segmentation, and ultimately gave rise to creatures endowed with a tendency to perform a cycle of changes with true generation. It is certainly true that while the earth's early condition favoured (if so it did) the spontaneous evolution of life, such earliest beings had no need of reproductive power beyond that implanted in the non-living matter whence they sprung. If, however, they were thus defective, it is plain that with the fading away of the terrestrial conditions favourable to the spontaneous production of life, either new forms must have arisen possessing reproductive capacity, or life must have come entirely to an end. The earliest complete organisms having been once evolved, they continued to be succeeded by living creatures, most, if not all of which were of increasing complexity of structure and possessing more and more varied powers. We have abundant evidence * that new species of animals and plants have from time to time arisen on the surface of this planet, and we have already noted some of † the leading modifications of form and function which the different division of the vegetal and animal kingdoms present. Amongst the functions of organisms, we have considered that of reproduction, and we have recognized the fact that each animal and plant goes through a special series of changes of form from its first condition as a fertilized germ till it attains maturity. This process of change is called the "development" and "evolution" of "the individual" ‡ or "ontogeny." Until the middle of this century it was generally supposed that each kind of animal and plant had a distinct and sudden origin, each kind being independent of every other at its first creation. Now, however, it has come to be mostly believed by naturalists that new species — new *kinds* of animals and plants—have from time to time arisen from antecedent kinds, which were different, by a

Ontogeny and phylogeny.

* See above, pp. 368, 369.
† See above, ch. xxi.
‡ See above, pp. 171, 173, and pp. 339, 340.

process of natural generation. This process is also a process of development or evolution, and such change is called the "evolution of species," or "phyllogeny." That all kinds of animals and plants have been evolved, and have some, however remote, genetic connection, is indicated by the general similarity of their chemical composition,* and the common properties of protoplasm.†• It is also indicated by the gradual development of higher forms of life, as evidenced by fossils,‡ and by the affinity which exists between the organisms inhabiting the earth's six zoological regions now § and those of tertiary times, which may have been the ancestors of the former. The existence of such genetic affinity is further confirmed by the resemblance which obtains between the embryos of higher animals and the adults of inferior species.‖ Again, rudimentary structures ¶ seem to point to the descent of creatures possessing them from others in which such structures were of functional importance. The way in which animals are classified ** also lends itself to the construction of hypothetical genealogical trees. The increasing complexity we find in active power, as we ascend from the Protozoa to Mammals, again points to descent with modifications. That the body of man himself has similar genetic relations, seems indicated by the fact that amongst the last animals to appear upon the scene, are man and apes;†† by his embryonic condition as regards the notochord, ‡‡ the visceral clefts and arches,§§ the great blood-vessels ‖‖ and the heart,¶¶ the brain *** and the lanugo.††† His structural affinity to the apes is shown not only by his adult anatomy, but by his exceptional embryonic resemblance to them,‡‡‡ even as regards the great toe of the infant.§§§ And the same may be said with respect to various functional characters.‖‖‖

All these seem to indicate that the living inhabitants of our globe have become what we see them to be now, by

* See p. 303. † See p. 325. ‡ See pp. 313, 368.
§ See p. 369. ‖ See p. 340.
¶ See pp. 151, 317, and below, p. 477. ** See p. 315.
†† See p. 369. ‡‡ See pp. 173, 317. §§ See pp. 173, 339.
‖‖ See pp. 172, 339. ¶¶ See p. 172. *** See p. 340.
††† See pp. 173, 340. ‡‡‡ See p. 340. §§§ See p. 173. ‖‖‖ See p. 341.

some process of gradual evolution which includes genetic affinity.

A familiar example of ontogeny.

We may, perhaps, best begin our investigation of evolution, both specific and individual, by considering a simple and familiar instance of the process of ontogeny. The new-laid egg contains, as every housewife knows, a semifluid, seemingly lifeless mass of two more or less homogeneous substances (the white and the yelk), and no more. Yet let such an egg be submitted for a time to certain definite physical conditions—such as a due supply of air, a certain amount of moisture, a certain degree of heat, etc.—and gradually that apparently passive mass of semifluid matter takes on an organic form. After a certain formation of superficial layers, and certain infoldings and swellings of a minute portion of its surface, a heart appears, and blood is formed and circulates. Gradually body and limbs, with all their organs, become defined, and ultimately a living chicken, clothed with downy feathers, chips the shell, comes forth, walks about, and quickly manifests the sharpness of its senses by pecking at grains or other small objects which it may find in its vicinity. The hatching of eggs being an everyday matter, our very familiarity with it tends to blind our eyes to its many marvels. Really, however, the process is a very wonderful one. The more it is pondered over and studied, the more wonderful it will be seen to be; and the most recent labours of biologists, who have made great progress in investigating such processes, have supplied us with additional motives for wonder and admiration.

Almost all living creatures, whether plants or animals, attain their adult condition by going through some essentially similar process *—some process of individual evolution. The process is sometimes a very short, rapid, and uninterrupted one; sometimes it is a very long process, which appears to be interrupted at certain stages, as in the evolution of the butterfly from the egg, in which the grub and chrysalis stages of existence last long enough to seem to be interruptions in what is really a continuous series of changes.

* See above, p. 339.

"Evolution" should, according to its etymology, mean a process of unfolding, such as we see in the expansion of a bud, whereby its minute, close-packed leaves become by degrees freely expanded. But evidently no minute organs exist folded up in the glairy fluid of the new-laid egg; and microscopic examination, instead of revealing any such enfolded rudiments, actually demonstrates their non-existence. It is none the less certain that they are not introduced from without. The gases of the atmosphere and its watery vapour find their way in through the pores of the egg-shell; but such matters, together with the physical influence of heat, are obviously quite insufficient to explain the formation of the blood, the heart, the eyes, the limbs, etc. It is evident that there must be something which no microscope can detect, present in the normal new-laid egg, which something is the real cause of the appearance of the different organs. This is demonstrated for us by the fact that if an unimpregnated egg, or one which has been allowed to die, be submitted to all those external conditions and processes which suffice to hatch a live impregnated egg, no chicken will ever be produced in either case.

The process of individual evolution or unfolding must, therefore, be a process of the gradual development of organs which pre-existed only in the sense that the living egg was endowed with an invisible, intangible, immaterial, internal force or power, capable of producing them all on the occurrence of the requisite external conditions.

Other processes.

Maturity once attained, the wonderful process of generation ensues—a process in some respects the reverse of ontogeny. The parent form develops, from a portion of its substance, detachable organic matter (the sexual elements), with an intermediate, subordinate, temporary life of its own. It is a form of life plainly inferior to that of the parent, unable by itself to propagate its kind, and only capable by junction with another complementary body, similarly possessing a temporary life, to give rise to an organism like that from which it sprang. Still more contrasted with ontogeny are the *post-mortem* changes of the dead body. As we have already seen,* it becomes

* See above, pp. 438, 439.

transformed into various distinct substances and such substances may either be restored as food to the living organic world or dissipated into those ultimate substances which chemistry is as yet compelled to regard as "elements."

Before we consider the relations which may exist between these changes and any external conditions, it may be well to examine with what theory of the composition of the universe they will best harmonize.

Explanatory cosmical hypotheses.

With respect both to the doctrine that the universe consists only of matter with intrinsic motion, and the doctrine that it consists of some unimaginable constituent, which is neither matter nor force, but of which extension and energy are modes or attributes, it has already been observed * that neither the one nor the other is evidently and necessarily false. Neither can be declared to be absolutely impossible, however improbable either may be.

Let us, then, assume, for argument's sake, that every seemingly distinct kind of material substance and every organism, really consists of different aggregations or forms of one substance, which is thus not a unity composed of separable constituents, but an *absolute* unity. On this hypothesis it is exceedingly difficult to understand how one form can ever generate another—as in generation and decay—without some miraculous interposition. To suppose such an interposition, however, would be equivalent to abandoning every theory of evolution. Yet if any one body is an absolute unity in its nature, it can never be changed into something else by the action alone upon it of other absolute unities of the same nature with itself. There must be something distinct from them to act upon them, either externally from without or internally from within. In order that any kind of transformation should take place without the action in this way of "something else," either internally or externally, we should need to be able absolutely to extract the category of quality from that of quantity, which is absurd.

The hypothesis, however, which affirms that every distinct

* See above, p. 440.

kind of material substance and every living body is a unity composed of two separable constituents—(1) the "matter," and (2) an immaterial "principle"—accords exceedingly well with all the phenomena made known to us by physical, chemical, and biological science, and plainly with the phenomena of generation and decay.

For, in the first place, according to this view, matter never exists or has existed, except as some definite kind of matter, which can indeed be transformed, but, which as long as it exists, is informed by one definite immaterial energy, that is its dynamic side, and makes it what it is. When dissolved into other substances, the matter which enters into its composition never ceases to be informed with some definite energy, or immaterial principle, one receding and disappearing *pari passu* with the advance of the other. This also is the teaching of common sense and harmonizes with what we see plainly before our eyes.

Secondly, according to this view, no immaterial principle (inferior in nature to the human soul) ever exists except as a principle of one definite kind embodied in matter. It is further supposed that the informing principles of different substances can, by mutual action, freely give rise to altogether new kinds of principles freshly embodied; not that a principle, *qua* principle alone, generates or destroys another, but only as *embodied*. The reader new to such considerations as these may naturally ask, Where does a principle which thus disappears altogether go to? He may also ask, Whence comes the newly arising principle which manifests itself for the first time come from? The answer to these questions is, There is no "whence" and no "where" for such immaterial principles save as embodied, and these questions only suggest themselves on account of our utter impotence to imagine anything whatever absolutely immaterial. If the reader, after taking care to guard himself against the delusions of his imagination, will consult only the dictates of his reason, and ponder over this question, he will then see that there can be no "whence" and no "where" for entities which are at once both absolutely unextended and immaterial, save when they come to be embodied in, or before they have

receded from, some definite quantity of matter. This conception once mastered, it becomes comparatively easy to understand how, in generation,* an embodied principle of a high order—that of the parent organism—may produce bodies animated by principles of an inferior order—sexual elements; and it is also easy to see how these, by their junction, may occasion the retreat of their own two inferior principles with the absolutely simultaneous elicitation, or evolution, of a principle of a superior kind, like that which occasioned their formation. It also becomes easy to understand generation by spontaneous fission, or by division (such as may be performed with the *Hydra*) and how intermediate, temporary, immaterial principles † can be evoked by mutilations such as those for a time energizing in the freshly excised heart or separated limb. It may, again, by means of this conception be understood how deviations from the normal course of development may result in malformed embryos which cannot continue to live, and how, in dissolution, with the retreat of the individuating principle of the body as a whole, there come to be formed those inferior temporary principles which manifest their energies in the temporarily continuing activities of the different organs and tissues of the recent corpse. Thus also can be easily explained the phenomena of "grafting" in both the animal world and the world of plants,‡ as well as that curious coalescence which we meet with amongst the Infusoria. The very same supposition which serves to explain these phenomena, serves also to explain the, at first apparently more simple, phenomena of nutrition. The various substances which serve as food, each an embodiment of a definite kind of immaterial energy, undergo the various transformations which may be needed (being in each case informed by one of those transitory principles which have successively to inform it), in order that it may be brought into the proximate condition for the performance of the final process of intussusception § before described. Then its last temporary informing principle retreats and disappears, as it becomes simultaneously in-

* See above, p. 436.
† See above, p. 437.
‡ See above, p. 439.
§ See above, p. 160.

formed by the individuating principle of the creature to be nourished. At the very same instant the matter composing it has become part of the actual matter of that creature's body. This view accords well with the facts of biology.

The nutrition of the body by food is a necessary condition for growth, and growth of the body, as we have long ago seen,* is a sort of generation. Closely connected with growth, also, are those processes of repair after injury,† to which attention was before directed; to the balanced harmonies of such processes of repair the phenomena of lateral and serial homology,‡ normal and teratological,§ are evidently akin, together with the symmetrical bodily modifications which occur in various diseased conditions. All these various processes can be well accounted for by the activity of the principle of individuation animating each individual organism, and they can be satisfactorily accounted for in no other way.

Psychogenesis of individual.

Of all these processes nothing is more wonderful than the development of the individual. In all animals above the Protozoa‖ we find that a single cell gives rise first to others like it, which arrange themselves in a definitely symmetrical manner, and afterwards give rise to others which are unlike their predecessors. Thus a variety of different kinds of cells—different tissue-elements: connective, cartilaginous, osseous, sanguineous, muscular, nervous, etc.—are generated in definite order, according to an innate preordained law, and these again divide and coalesce in diverse ways, and so by degrees build up the different organs of the developing body in each of which these tissues enter in various definite degrees and proportions. About the whole process there is nothing which appears haphazard or fortuitous, but all proceeds with order and precise regularity. The process of development of each organism is thus the embodiment of a directing idea of which it has no perception itself. But no mere idea can by itself direct anything or even exist. It must pertain to some active principle which possesses it, and which may, if conscious, be guided by it, and if unconscious may make

* See above, p. 163. † See above, p. 169. ‡ See above, p. 152.
§ See above, p. 429. ‖ See above, p. 320.

manifest the idea, pertaining to a higher intelligence, which it unconsciously embodies. Such is the principle which animates and individualizes every organism. The presence of such an innate, directing constitutive element is, indeed, especially evident in the development of the embryo, where all that takes place is manifestly controlled and directed to the effecting of one definite end—even more plainly, perhaps, than in the healing of a wound or the reproduction of a lost limb. It is manifestly a process carried out in fulfilment of a predetermined end, and is an instance of "final causation." Any one who would pretend that the mere conflict of independent efficient causes can produce and co-ordinate whole series of effects, resulting in the attainment of a definite end which they have all concurred to produce, would certainly go against all our experience. Any one, also, who should pretend that we cannot affirm a "purpose" to exist in different natural processes (*i.e.* who denies that we can assert a "final cause" for any phenomenon) because we may be unable to state the final cause of the whole series of physical phenomena, would be like a soldier who, because he was ignorant of the plan of campaign of his commander-in-chief, should pretend that therefore he could not infer that commander's purpose in sending medical stores to the military hospital. Ontogeny is, therefore, a teleological process, and it is one carried out through the action of the directing and innate energy of the developing animal—its principle of individuation, or psyche, by which, as before said,* the living organism builds up its being. It is thus a process of *psychogenesis*.†

Phyllogenetic hypotheses.

Having thus pondered over the life-processes of the individual organism, and armed ourselves with the foregoing conception of the nature of each, let us turn to consider the question of the genesis of new species.

We may conceive the evolution of new specific forms to have been brought about in one or other of the six following ways:—

1. Entirely by the action of surrounding agencies on organisms having a merely passive capacity for being

* See above, p. 436. † See above, p. 440.

indefinitely varied in all directions, and with no positive inherent tendency to vary, whether definitely or indefinitely.

2. Entirely by innate tendencies in each organism to vary in certain definite directions.

3. Partly by an innate tendency to vary indefinitely in all directions, and partly by the limiting actions of surrounding agencies checking all variations save those which happen accidentally to be favourable to the organisms which vary.

4. Partly by an innate tendency to vary indefinitely in all directions, and partly to external influences which not only limit, but stimulate and promote variation.

5. Partly by an innate tendency in organisms to vary definitely in certain directions, and partly to external influences acting on variation only in the way of restriction and limitation.

6. Partly by an innate tendency to vary definitely in certain directions, and partly to external influences which, in some respects, act restrictively, and in other respects act as a stimulus to variation.

The best known and most popular explanation is that given by Mr. Darwin in his "Origin of Species." According to this view new species have been brought about by the action of what he called "natural selection;" that is, by the accidental preservation, through the chance action of the destructive powers of nature upon minute fortuitous variations, occurring in all directions, of such variations as happened to be the most favourable. His hypothesis, therefore, accords with the third of those above suggested as possible explanations. So many more living creatures being generated than could live, he deemed such chance destructive agencies to be sufficient reason for the formation of new species, since only those which presented favourable variations could possibly survive such destructive action. He thus sought to account for all the forms and powers present in nature, including the mind of man with all its perceptions of truth, goodness, and beauty. We have been careful to provide the reader with references to those facts which favour Mr. Darwin's hypothesis. Such are the various interrelations which exist between

organisms * and the phenomena of mimicry.† We have also pointed out ‡ how favourable variations in voice, colour, other ornamentation, or strength, may enable an animal to survive, and to transmit such characters to offspring by obtaining a mate.

Heredity and environment.

Let us now look a little closely into the nature of the possible factors directly affecting the evolution of species by natural generation. The first and most potent of these is the action of heredity.§ Heredity is obviously a property, not of new individuals, not of offspring, but of parental forms. It is the innate tendency which each organism possesses to reproduce its like. If, as we have before pointed out,‖ it acted alone, each parent organism would produce offspring completely like itself. This fundamental biological law of reproduction may be compared, as it has been compared by Dr. Gasquet, with the physical first law of motion, according to which *any body in motion will continue to move on uniformly at the same rate and in the same direction until some other force or motion is impressed upon it.* The fact that new individual organisms arise from both a paternal and a maternal influence, and from a line of ancestors, every one of which had a similar twofold origin, modifies this first law of heredity only so far as to produce a more or less complex compound of hereditary tendencies ¶ in every individual, the effect of which must be analogous to the mechanical law of *the composition of forces.* All such action is but "heredity" acting in one or other mode; but there is another and fundamentally different action which has to be considered, and that is the action of the environment upon nascent organisms—an action exercised directly upon them, or indirectly upon them through its direct action upon their parents. The action of external conditions in many instances we have already noted.** It is, however, obvious that the very same external influences will produce different effects on different species, as also that the nature of some species is more stubborn

* See pp. 369–371 († See pp. 372, 373. ‡ See p. 374.
§ See above, p. 173. ‖ See above, p. 440. ¶ See above, pp. 172, 174.
** See above, p. 376.

and less prone to variation than that of others. Such, for example, is the case with the ass, the Guinea-fowl, and the goose, as compared with the dog, the horse, the domestic fowl, and the pigeon. Thus both the amount and the kind of variability differ in different races, and such constitutional capacities, or incapacities, tend to be inherited by their derivative forms, and so every kind of animal must have its own inherent powers of modifiability or resistance. Therefore no organism or race of organisms *can* vary in an absolutely indefinite manner; and if so, then unlimited variability must be a thing absolutely impossible. The foregoing considerations tend to show that every variation is a function of "heredity" and "external influence"—*i.e.* is the result of the reaction of the special nature of each organism upon the stimuli of its environment.

In addition to the action of heredity and the action of the environment, we have also recognized another kind of action manifesting the existence of an internal force to which are due so many interesting cases of serial and lateral homology to which we have just referred, and which cannot be due to descent. If we not only assume that vertebrate animals are descendants of a common ancestor, but also make the extravagant (and, as we believe, untrue and unwarrantable) assumption that they are the descendants of a creature formed by the coalescence in a linear series of independent, separate, lowly animals,* it only makes the remarkable facts of lateral homology still more mysterious. On this assumption, the genetic relationship between a man's arm and a bird's wing must be almost infinitely closer than that between a man's arm and his leg, and this again much more recent than that between his right and his left arm. According to such an hypo-

* It has been suggested that all kinds of worms have arisen from ancestors each of which was like one of the segments only of the much segmented worm which has descended from it. Such simple ancestor has been supposed to have had the habit of multiplying by spontaneous fission, and some of its descendants to have been benefited (and therefore preserved) by having divided only imperfectly, and so given rise to creatures (such as the Annelids and Arthropods) the bodies of which consist each of a longitudinal series of segments. Vertebrate animals being also supposed to have descended from some kind of worm, the successive portions of the body would thus originally have had separate ancestors, the descendants of which had found their profit in not dividing completely.

thesis the arm and wing inherit their homology from the anterior limb of the common ancestors of birds and mammals; but man's arm and leg would have no common ancestor more recent than the parent of the imaginary separate creatures which, by their junction, gave origin to the ancestor of the vertebrates. Thus also the common ancestor of the right and left arms must have been still more remote. Yet when we compare man's arm with his leg, we find that they agree in having striking resemblances (homologous features), which must not only be more recent than the time when man's ancestors diverged from the ancestors of birds, but more recent even than the separation of the anthropoid apes from the general Simian stem. For man's hand and foot resemble each other in the texture of the skin and the shape of the nails; and these resemblances exist, not on account of similarity in external conditions, but in spite of them; and we meet with countless similar resemblances all through the animal kingdom.* It seems, then, to be undeniable that the characters and the variations of species are due to the combined action of internal and external agencies acting in a direct, positive, and constructive manner.

Action of natural selection.

Now, it is perfectly evident to the meanest understanding that no character very prejudicial to a species could ever be established, for such a species would be destroyed by the action of its environment. So much truth, of course, there is in the hypothesis of "natural selection." But its action can only be destructive and negative. The evolution of new species, however, is as necessarily a constructive and positive process, and must be due to those changes upon which natural selection acts. Spontaneous positive change, which thus must lie at the origin of every new species, is (as we have seen) the reaction of the nature of the varying animal upon all the multitudinous agencies which environ it. Thus, the "nature of the animal" must be taken as *the* cause, "the environment" being the stimulus which sets that cause in action, and "natural selection" the agency which restrains it within

* See a remarkable paper on Homologies by W. K. Brooks, in the "Phil. Trans." for 1882.

the bounds of physiological propriety. The influence to which Darwin ascribed the origin of species could never by any possibility have been the cause of their origin. "Natural selection," instead of guiding and determining the ramifications of the "tree of life," can do no more than apply the pruning-knife to them. We may compare the production of a new species to the production of a statue. We have (1) the marble material—representing the matter of the organism; (2) the intelligent active force of the sculptor, directing his arm—representing the psychic nature of the organism, which reacts on stimuli according to definite laws, as surely as in the case of reflex action, repair of injuries, or any other vital activities; (3) the various conceptions of the artist, which stimulate him to and in his work—representing the environing agencies which provoke on organisms variations; and (4) the blows of the smiting chisel, which represent the action of natural selection. No one would call the mere blows of the chisel—apart from both the active force of the artist and the ideal conceptions which direct that force—*the* cause of the production of the statue. They are *a* cause; they help to produce it, and are absolutely necessary for its production. They are an instrumental cause, but not the primary and effective cause. This distinction runs through all spheres of activity, and thus "natural selection" is as inadequate to explain the origin of an instinct as the origin of a species. Darwin has sought to explain instinct as partly the result of accidental variations of activity naturally selected, and partly as the result of intelligent, purposive action which has become habitual and inherited. But this explanation is evidently no explanation of the *origin* of instinct, but only of the changes and transformations of instincts already acquired. But putting back the date or modifying the form of the original instinct in no way alters the essential nature of instinct or diminishes its mystery. Let us look at one or two noteworthy instincts and see if it is credible that they should be due to mere accidental, haphazard, minute changes in habits already acquired.

In the first place, there is the wonderful instinct of the duck which feigns to have an injured wing in order to

entice a dog away from her ducklings. Is it conceivable that such an act was first done by pure accident, and that the descendants of her who so acted, having inherited the tendency, have been alone selected and preserved? Again, there in the case of the wasp (*Sphex*) which stings spiders, caterpillars, and grasshoppers in the spots where their nervous ganglia respectively lie, and so paralyzes them. According to the doctrine of natural selection, either an ancestral wasp must have accidentally stung them each in the right place, and so our sphex of to-day is the naturally selected descendant of a line of insects which inherited this lucky tendency to sting different insects differently, but always in the exact situation of their nervous ganglia; or else the young of the ancestral sphex originally fed on dead food, but the offspring of some individuals which happened to sting their prey so as to paralyze but not kill them were better nourished, and thus the habit grew. But the incredible supposition that the ancestor should accidentally have acquired the habit of stinging different insects differently, but in each case in the right spot, is not eliminated by the latter hypothesis. There is, again, the case of neuter insects and the highly complex instincts of those insects which live in communities, such as bees, ants, and termites. The Darwinian theory has the great advantage of only needing for its support the suggestion of some possible utility in each case to existing organisms, or to some of their hypothetical ancestors who may be called up in imagination for this very purpose. As all structures and functions have some utility, the task is not a difficult one for an ingenious, patient, and accomplished thinker. Yet Mr. Darwin, with all his ingenuity, patience, and accomplishments, has been unable to suggest a rational explanation for the accidental origin of these insect communities, with their marvellously complex instincts. The instinct of the Emperor-moth and the stag-beetle also seem inexplicable by natural selection, and the reader will do well to consider the other cases of instinct hereinbefore mentioned.* I will here confine myself to one more instance of a highly noteworthy instinct which no one has in any

* See above, pp. 358, 361

way succeeded in explaining. The instance I refer to is that by which an animal, when an enemy approaches, lies quite quiescent and apparently helpless, an action often spoken of as "shamming death." To evade the force of this remarkable case of instinct, it has been objected that the disposition of the limbs adopted by insects which thus act, is not the same as that which the limbs assume when such insects are really dead, and that all species are not, when thus acting, equally quiescent. The first observation, however, does not concern the matter really at issue. The remarkable thing is, not that a helpless insect should assume the position of its own dead, but that such a creature, instead of trying to escape, should adopt a mode of procedure utterly hopeless unless the enemy's attention is thereby effectually eluded. It is impossible that the instinct could have been gradually gained by minute steps, for if the quiescence, whether absolutely complete or not, were not sufficient at once to make the creature elude observation, its destruction would be only the more fully insured by such ineffectual quiescence.

The same argument applies to birds which seem to feign lameness or other injury. Yet, even if we could account for these cases, which, as a fact, are as yet entirely unaccounted for, it would not do away with the need of recognizing the real existence and peculiar nature of instinct. It would not do so on account both of man's highest and of his lowest instinctive powers. To speak first of the former: As instinct, such as we have hitherto considered, is the appointed bridge between merely organic and animal life, so there is in man a further development of instinct peculiar to him, and serving to bridge over the gulf between merely animal faculties and distinctively human, reflective, intellectual power. Such a special intellectual instinct is that which impels man to the external manifestation by voice or gesture of the mental abstractions which his intellect spontaneously forms, and which (as we have seen) are not formed by animals. Analogous considerations apply to the first beginnings of what cannot be reckoned as mere instinctive activities, but the origins of which must have been akin to instincts—such

as the beginnings of literature, art, science, and politics. But a consideration of man's lowest powers alone suffices to show that they cannot be due to "natural selection," even when aided by "lapsed intelligence." Can it be for a moment seriously maintained that such actions of the infant as those of sucking, deglutition, and defecation, or the sexual instincts of later life, ever arose through the accidental conservation of haphazard variations of habit in ancestral animals? If not, then it is impossible successfully to evade the difficulty of the existence of instinct. However far we may put back the beginnings of instinct, the question as to its origin (with its subsequent modifications) ever returns, and, indeed, with increased importunity. How did the first sentient creatures obtain and swallow their food? How did they first come to fecundate their ova or suitably to deposit them? How did they first effect such movements as might be necessary for their respiratory processes? Wherever such phenomena first manifested themselves in sentient organisms, we are compelled therein to recognize the manifest presence of instinct—the appointed means (as before said) of bridging over the interval between the purely vegetative functions and the complex activities of sentient animal life. Thus, natural selection again cannot be the cause of specific origin, and to say that it takes place through it is an evident mistake. The *formal* discoverer of a new fossil is the naturalist who first sees it with an instructed eye, appreciates and describes it; not the labourer who accidentally uncovers but ignores it, and who cannot, any more than the spade he handles, be other than a mere instrumental cause of its discovery. So we must regard the sum of the destructive agencies of nature as an instrumental cause of the origin of new species, their formal cause being the reaction of the nature of their parent organisms upon the sum of the multitudinous actions of their environment.

What lesson does the development of the individual teach us? Mr. Alfred Wallace himself has said, "No thoughtful person can contemplate without amazement the phenomena presented by the development of animals. We see the most diverse forms—a mollusk, a frog, and a

mammal—arising from apparently identical primitive cells, and progressing for a time by very similar initial changes, but thereafter each pursuing its highly complex and often circuitous course of development with unerring certainty, by means of laws and forces of which we are totally ignorant. It is surely a not improbable supposition that the unknown power which determines and regulates this marvellous process may also determine the initiation of those more important changes of structure, and those developments of new parts and organs which characterise the successive changes of the evolutions of animal forms."

In truth, a study of the earliest stages of individual evolution serves both to support the doctrine of evolution against those who would deny it and to refute the notion that it takes place fortuitously by "natural selection," instead of teleologically along definite lines, according to innate preordained law. For the primitive cell of the ovum generates other cells which evolve yet others, of different natures—namely, those which form all the various tissues of the adult animal. Therefore, if there is a parity between nature's genetic processes, organisms (like such primitive cells) may be expected to generate other organisms of different kinds—like the diverse kinds of cells generated from the primitive ones. Similarly, also, such generated organisms should—like the generated cells—be formed definitely, according to innate laws and teleologically, or for a predestined end. If the development of the individual presents us with a sketch (as Darwinians say it does) of the past phyllogeny of the race, then the earliest stages of such phyllogeny *must* have been due to the action of definite innate laws. But if the earlier species were thus evolved, why are we, in imagination, to make a break in the process, and where?

Independent origin of similar structures.

The belief that species are thus definitely evolved as individuals are, is supported by the fact that similar structures are often formed independently, and that various groups of organisms may thus have had a dual genetic origin. There is some reason to suspect* that the rudimentary calcareous teeth of the young Ornithorhynchus

* See *Proc. Royal Soc.*, February, 1888, vol. xliii. p. 372.

and the teeth of ordinary mammals may have grown alike from different origins. The same also may be said of the eggs of the Ophiomorpha * and of birds aud reptiles, and is certainly the case with some of the teeth of the marsupials (pouched beasts),† *Perameles*, *Macropus*, and *Thylacinus*, on the one hand, and of the non-marsupials, *Urotrichus*, *Macroscelides*, and *Canis* on the other. Most striking of all is the extraordinary, even microscopic, resemblance between the teeth of the Aard-vark (*Orycteropus*) ‡ and of the Elasmobranch fish (*Myliobatis*). Again, it would be difficult to find a more curiously resembling structure of certainly independent origin than the hinge-teeth of the Angler-fish (*Lophius*), those of the pike, and those of certain fishes brought home in H.M.S. *Challenger*. The poison fangs of different kinds of serpents have also arisen independently, and quite independently have also arisen the poison-teeth of the only known poisonous lizard, *Heloderma*. The scrotum of placentals and the singularly placed scrotum of marsupials (so difficult to explain by "natural selection") must likewise have had a dual origin, as also has the prehensile feet of the opossums and the apes. I have long urged the probability of the diverse origin of the apes of the old and new worlds, § and now Professor Cope brings forward ‖ various reasons for believing that the ancient horse of America and the horse of Europe have had a widely distinct ancestry, and have grown alike through two distinct lines of descent. The Axolotl, a European eft (*Triton Alpestris*), the *Proteus*, *Menobranchus*, and *Siren*, have all independently acquired a permanent state of existence such as must have been but a temporary state in the lives of their several genetic predecessors. The definite action of climatic conditions upon organisms has been shown in a preceding chapter,¶ as also has the curious direct action of environing colours on the chrysalids of moths.** Thus, altogether, there seems to be much evidence *à posteriori* to reinforce the *à priori* presumption that nature follows a parallel course in both ontogeny and phyllogeny, and that

* See above, p. 314.
† See above, p. 316.
‡ See above, p. 316.
§ See above, p. 316.
‖ See the *American Naturalist* for December, 1887.
¶ See above, p. 377.
** See above, p. 374.

nutrition, growth, repair, reflex action, sensori-motor action, the evolution of the individual, and the evolution of the species, are all processes carried on according to definite innate laws. But if changes occur along preordained lines, and not fortuitously and in all directions, then the action of natural selection becomes an altogether subordinate action, and it would be manifestly absurd to attribute to *it* the origin of new species.* All nutrition, growth, and reproduction are, as we have seen, controlled and ultimately effected by that active, dynamic side of an organism which we have named its principle of individuation, or psyche. Therefore, it is also by it that those physical changes are effected which result in the evolution of a new species. The genesis of a species then takes place (as before said) by the action of the nature of the parent organism—that is, through its psychical activity ; and thus its mode of origin may—as opposed to the hypothesis of natural selection—be fitly termed *psychogenesis.*

Psychogenesis of species.

We have above referred, most briefly, to man's higher faculties with reference to the action of natural selection, and before concluding this subject it seems necessary to say a few more words on a theme so important and so well calculated to serve as a decisive touchstone with respect to the adequacy of the Darwinian doctrine. We have

Origin of man.

* In a recent obituary notice of Mr. Darwin (*Proc. Roy. Soc.*, No. 269) it is stated that an upholder of natural selection may affirm species to have arisen by sudden, considerable variations of definite kinds due to any cause, and that indifferent or even slightly disadvantageous characters can be evolved ; while he must deny natural selection could even evolve the incipient stages of characters subsequently useful. But indifferent or slightly disadvantageous characters are just those which constitute many species (*e.g.* the Potto, see above, p. 317). Therefore no one species so characterized could arise through natural selection. Similarly, useless structures which are constantly inherited are specific characters, and whatever produces a race with such characters produces the species. Therefore, by the admission of this writer, such species were never originated by natural selection. The statement of this obituary notice is equivalent to a tacit abandonment of natural selection, the term being all the time retained and applied to something directly contrary to what Darwin intended by it, the action of natural selection being reduced to that merely subordinate *rôle* which every one allows that it does and must play. Such a use of the term "natural selection" comes to little more than this : "Some species succeed, others fail ; therefore the former may be said, metaphorically, to be 'selected.' Those which succeed do so on account of some causes or other, and since every cause is a natural cause, all species must arise from 'natural selection.'" In other words, "Nature is so constituted as to produce the results it does produce ;" a statement which is very true, but neither very new nor very instructive.

already abundantly seen* that the idea of right is an absolute and peculiar idea which could never have been generated by any amount of pleasurable and painful sensations. We have recognized that at the root of every ethical judgment which is not self-evident there must lie another judgment which is ethical and nothing else. Social pressure to enforce conformity to useful social rules could not generate it. No stream can rise above its source. How, then, could a habit of unquestionably obeying his society lead a man to despise and defy his society in obedience to an ethical perception? We are far indeed from denying the frequent utility of social action for the cultivation of ethics. Of course, the influence of parents, friends, and society, is the appointed means for developing, but not for creating, the idea of "duty;" just as feelings of motion, pressure, and the muscular sense, are the appointed means for developing the idea of "extension." It is the same with our perceptions of truth and beauty, which we have seen,† are *toto cælo* different from the feelings which serve to elicit them in a mind capable of forming abstract ideas. Even with regard to the arts, one may see the impotence of natural selection to account for their origin. A keen sense of hearing has doubtless often aided the preservation of individuals, and possibly of tribes, and a power of emitting musical notes may have been useful in courtship, and have been so perpetuated in offspring. But how could such causes have ever occasioned the perception and cultivation of musical harmony—an art that dates, as it were, but from yesterday, but which is the characteristic art of our age, as sculpture was of Greece or architecture of mediæval Europe?

The fundamental error of Darwinism, as regards the origin of man, is its want of comprehension of what "thought" and "knowledge" really are, and the confounding of associated feelings (sensations, feelings of relation, and emotions) with the perceptions of objective facts, and the apprehension of supersensuous ideas and truths. A correct appreciation of the fundamental distinction which exists between our higher and our lower faculties shows

* See above, p. 243. † See above, pp. 252–254.

us that reason could never have been evolved from faculties such as those of even the highest brutes. It further shows us that with the advent of man a new entity was introduced into the world—an entity different in kind from any that had before existed, because possessing faculties different in kind and not in degree, from those possessed by any merely animal predecessors.

An objection has been made to such a fundamental difference between man and other animals as is here asserted to exist, on the ground that as an infant he is no better off, mentally, than they. His mental powers are, at first, apparently inferior to the psychical faculties of many animals, and only very slowly does he learn to use rational language. This objection has been already replied to,* but a few words may here be added. The resemblance of the unconscious infant (whose instincts are less developed than those of many new-born beasts) to a mere animal is but a superficial one, and results only from the imperfection of our powers of observation. That from the first the whole difference is latent is what the event proves. It is like the superficial resemblance of an embryonic reptile to an embryonic bird, or even of an embryonic mammal to an embryonic fish. The reptile never *is* a bird nor the beast a fish, though the immature stages of their development are superficially alike. Similarly, an embryo man is never an animal of any other kind. But it does not follow that in the earlier stages of development, the incipient body may not be informed by successive temporary, incomplete principles of individuation, for such, we have seen reason to believe, inform the very sexual elements; but as soon as ever the body is truly a human body, so soon we have every reason to believe it is informed by a distinctively human soul. To believe otherwise without evidence would surely be a piece of gratuitous credulity. Man, therefore, differing thus profoundly from other organisms, must similarly have been introduced into the world by some action correspondingly different—that is, different in kind—from those agencies whereby all anteriorly existing organisms had been produced. A calm and careful consideration of the

* See above, p. 294.

facts of the world about us and in us, suffices to afford abundant evidence that the Darwinian view is one due to incoherent thought and superficial inductions, made in the teeth of contrary evidence. It reposes, indeed, not on evidence, but on ignorance and a deplorable confusion of ideas. It will be effectually put an end to by a wide diffusion of knowledge as to what human speech and human intellect really are. As Wilhelm von Humboldt long ago most truly said, "Man is man only through speech, but in order to invent it he must be already man." Man's distinctive prerogative—the power of rational speech—is the sign, evident to our senses, of the supreme dignity of that admirable human intellect which well merits to be the object of our continuous admiration, and which refuses to come within the power and scope of any merely physical and organic process of evolution. But the doctrine of the "bestiality of man" is an essential and integral part of the Darwinian system. The value of that part of the hypothesis, then, is a fair test of the value of the whole. Some readers may be inclined to ask how so many men, eminent in physical science, can be blind to the absurdity of the Darwinian doctrine about man? The answer to this question is, that the inquiry as to man's origin is one not of physical science but of philosophy, and that these two fields of mental activity are hardly ever cultivated by the same persons with anything like the same care and attention. One or the other is neglected, avowedly or otherwise. Thus it comes about that men may be very distinguished for their knowledge of physical science, and yet be ignorant about the operations of their own minds and the nature of the intellectual acts they daily and hourly perform. Such is conspicuously the case in the present instance. The Darwinian doctrine is supported by men, and only by men, who are victims to the fundamental error which confounds "ideas" with "faint revivals of past feelings," and "the association of imaginations" with "rational inference." It is owing to this that no Darwinian has ever yet ventured to grapple with the essence of the question.

Apart, however, from the questions of man's nature

and origin, natural selection could never have formed the species of the animal and vegetal worlds, since, as we have seen, it can only act on structural and other characters which it finds ready to its hand. These characters, however, must be due either to "heredity" or the conditions of existence which have provoked and elicited change. But what of those "conditions of existence"? They, at least, are not the result of any process of "natural selection," nor are its component factors (*e.g.* the force of gravitation and the activities of light and heat) themselves subject to any process of evolution, or the universe would soon come to an end. But it is impossible to ascribe to these active but inanimate "factors of existence" either intelligence or will; they can be but the agents of an intelligence and will extrinsic and superior to themselves. The Darwinian theory is alike inapplicable to the lowest and to the highest, the simplest and the most complex phenomena of the universe.

It is said that Mr. Darwin has been unfairly accused of assigning the origin of species to the action of chance, and enthroning Unreason as lord of the universe. What, then, is "chance"? No man of science uses it to denote the occurrence of any phenomena without some cause. The word "chance" is used in two senses—(1) as opposed to design, and (2) to denote things the causes of which are too complex to be unravelled.

Now, the phenomena of the universe must be due to a causation which is either intelligent or not-intelligent, and the whole tendency and teaching of Darwinism is against the action of intelligent causation. Before Darwin's time, the evidence of design in the phenomena of organic life was regarded as obtrusively evident. His teaching (though the phenomena of nature do not really justify it) made it possible for those who desired to deny design in the organic world to deny it, and relegate its phenomena to the category of mechanical activity. In this sense he is justly accused of deifying Unreason.

If, however, he had really succeeded in proving that all the activities of animals and plants were merely mechanical, his labour would have been in vain as regards

the establishment of a mechanical philosophy. For, as it has been the object of this book to show, the most certain of all certainties are our certainties about our own existence and powers, and about universal necessary truths, including that of causation. These amply suffice to demonstrate that the causation of the universe is intelligent, since otherwise the First Cause would not have been adequate to produce that intelligence which we know to exist in ourselves. As we have seen,* that universe could never have been submitted to the action of natural selection, nor could the law of uniformity which pervades it be due to natural selection either. Neither could the primary laws, properties, and powers of the other primary materials of the universe have been due to it; nor the incipient stages of the first living organisms, nor even those indifferent or even slightly disadvantageous characters † which form the definition of so many species. The action of "natural selection" itself could never have been educed by "natural selection." It was, therefore, preordained, and it follows that everything the evolution of which its action helps on, must have been preordained likewise. Evolution, therefore, is, and must be, a process full of purpose and replete with design which exists, not only at its root and origin, but accompanies it at every step of its progress. When, having recognized the guidance of a Divine reason, we reconsider the play of nature's destructive forces, we must recognize therein also an orderly and providential action to which is due, not the creation of species alone, but of animal communities, human families, tribes, and nations, the destructive and constructive powers of nature alike concurring in their formation. The primary elements and minutest ultimate constituents of the great whole, and our own highest faculties, cannot have been due to "Natural Selection."

But if (discarding chance) we are compelled to hold that these primary conditions of existence and the faculties of moral and intellectual activity in man are both due to a supreme conditioning and creative will, why is it less credible that the same power has called into being, by the means of ordained secondary causes, all the varied

* See above, p. 453. † See above, p. 380.

species of animals and plants which form an essential part of the great whole, and for which the inorganic cosmos has been formed, as they in turn have been formed for our sakes who alone of organic beings are capable of apprehending, employing, and admiring them, and who, as mere reason sufficiently assures us, have been formed in the likeness and image (however inconceivably minute) of that Divine Intelligence in whom we live and move and have our being? But such an evolution of species as this is a form of "creation"—derivative creation. It is supremely teleological, and final causation accompanies the whole process from its beginning to its end.

Space does not allow more to be said here upon this fruitful theme, and it is the less necessary as I have discussed it in detail elsewhere.*

Our verdict, then, is that new species are evolved in the last of the six modes hereinbefore † suggested as possible; in other words, they are evolved by the "nature," that is, the "principle of individuation" of organisms, which has *definite* tendencies to variation, and the action of which is partly stimulated and partly restrained by the action of surrounding agencies.

The origin of the human species must, however, belong to a different category, since, as we have seen, in spite of the exceedingly close resemblance of the human frame to the structure of apes,‡ the soul of man possesses powers so utterly distinct in kind from those possessed by any other known existence in the material universe, that it merits to be distinguished by a radically distinct denomination—that of "spirit." §

As to the *mode* of its formation, reason tells us absolutely nothing save that it is through some Divine action different in kind from that by which every other organism has been called into being. Neither is it possible to decide whether man's soul and body were simultaneously created as they now are, or whether a rational soul was infused within an organism that had been psychogenetically evolved

* See the "Genesis of Species" (Macmillan) and "Lessons from Nature" (John Murray).

† See above, p. 511. ‡ See above, p. 503. § See above, p. 392.

from some pre-existing irrational creature. Analogy is against both these modes of formation, and yet we have here no natural guide but analogy.

Let us assume, for argument's sake, that man was suddenly created in his entirety, body and soul, as we see him now. If a rational animal was destined to exist at all, he must have been made to resemble *some* other animal, and he must have been provided with means for expressing his thoughts by external signs with great rapidity. Such a being could hardly have been formed on the type of any of the inferior sub-kingdoms or classes of the animated world, and thus he must have accorded with mammalian structure as he does accord. But surely the members of no order of that class have a body nearly so well organized to serve the purposes and perform the actions demanded by a rational nature as have the apes. It would seem, then, that almost as soon as ever an animal form had been evolved, well adapted to serve as the corporeal frame of a truly intellectual being, man suddenly—as it were, abruptly—appeared.

Such would seem to have been the fact, because the difference which we find between the human form and that of his nearest corporeal allies amongst brutes, is quite trifling to that which exists between the latter and creatures of other orders of the class mammalia to which we and all beasts belong. Nevertheless, the instantaneous, absolute creation of man's body is the more startling hypothesis, though the difficulty of accepting it is greatly due to the tyranny of the imagination. Such a process must, of course, be absolutely imperceptible to our senses. Were a man like ourselves freshly created beside us at this moment, all we could perceive would be that there was a man where before we saw no one, and all we could do would be to wonder or inquire, whence he might have come. Speculation, therefore, as to this enigma is useless.

Conclusion as to evolution.

The universe, then, may be conceived of as having been evolved through the implanted powers of the multitude of immaterial principles existing potentially within it, and becoming actual existences in matter—as so many inorganic and organic substances and individual organisms—

freely generated and evolved in and out of existence under the pervading influence of an omnipresent Divine Energy which, at the commencement of all time, created and impelled along its course the, to us, vast whole to fulfil ends in part certainly perceptible to us—amongst them a manifestation of Divine ideas *—but probably also for others which we have no power to conceive of. We have already seen † how the various orders of material existences which people this globe constitute a hierarchy of ministration leading up to man, and that, whatever ulterior purposes it may also serve, the earth has been destined as an arena for the exercise of good volitions and the ethical development of mankind. We have seen also ‡ that goodness necessarily demands not only recognition but the reward of happiness, and that the greatest happiness of the best of mankind can be nothing else than the most complete knowledge of, and union with, God, of which our being may be capable. This world, then, points to something beyond itself, not only unimaginable but inconceivable, and to which its being is subservient. May we not, then, deem it probable that the whole universe, like our earth, constitutes a series of ministrations, only on an infinitely greater scale, and that the soul of man is but one of a vast series of orders of created spirits of which our senses can take no cognizance, but the existence of which our active intellect may divine? So also as this world of ours is but an arena for the perfecting of an order of being infinitely more glorious, because spiritual, than anything the realms of irrational nature offer to our senses, may we not anticipate that the whole universe exists for a purpose and end beyond itself, in the fulfilment of which will be its perfection and its glory?

Whatever may be the truth with respect to these matters—so remote from experience and so incapable of being certainly ascertained by our natural powers—one thing is not only ascertainable but certain. It is the fact that for us men the one supreme end is the fulfilment of duty, and that the most important thing of all for us is not "knowledge" but "conduct."

* See above, pp. 496, 497. † See above, pp. 493, 494. ‡ See above, p. 488.

The most important of all knowledge for us is, and must be, the knowledge of God and of the true relationship in which we stand to Him and to all other spiritual existences. But this is the science of "the sociology of Intelligences," or religion. And thus the most important agent in the highest form of evolution is religion in action * as our instructor and guide.

Religion and philosophy.

With the consideration of the supreme question of religion, we have reached the culminating point of our prolonged inquiry as to truth. In recognizing the nature and scope of that highest form of sociology—that of all intelligences—we can clearly foresee that it must have close and imperative relations with human conduct. We recognize that the object of our intellect and affection is an adequate and fitting object. Mere abstract truths and intellectual ideas are not sufficient—are not the natural objects of human affection and devotion. Rational man can truly revere and love nothing which has not personality,† nothing which cannot understand, accept, and respond to his reverence and devotion. God, as the source of all truth, and an Almighty Being from whose Essence all goodness, all beauty, and all love proceed, is at once the one and only possible object which can satisfy the intellect, the emotions, and the will of man. His Divine Existence is at the same time both the highest revelation and the deepest foundation of all those truths which have occupied our

* We are sometimes told that religion is a matter of "feeling," not of "reason;" that it concerns not "the intellect," but "the emotions," especially those of awe and reverence, and that it is independent of all categorical statements as to questions of fact concerning matters which are superhuman. Evidently, however, we cannot feel "awe" and "reverence" for anything except we believe that it exists. Denial or doubt as to its existence must induce the destruction or paralysis of emotions respecting it. The emotion may survive for a time, but no reasonable man could continue in a state of rapture over mere dreams, and still less over recognized nonentities. But religion refers, essentially, to intelligences such as our own, or to higher intelligences. We cannot experience "religion" with respect to merely unintelligent or inanimate objects. To feel "awe" and "reverence" for a volcano, a whirlwind, or the rising sun, may be expected of a savage, because he may (with reverence and fear), more or less distinctly, apprehend in such phenomena, the action of some mysterious, superhuman personality. But let a man be convinced that such phenomena are merely physical, that they are in no way related to an intelligence higher than his own, and then, however much he may admire, dread, or wonder at them, any real reverence on his part is impossible.

† *I.e.* has intelligence and will (see above, pp. 392, 436).

attention in this systematic inquiry. That inquiry thus culminates in the justification of the spontaneous affirmations of common sense, through a careful analysis of the highest declarations of the intellect, and it has also shown the harmony which exists between the various powers of our nature and between our own thoughts and things external.

The philosophy which this systematic inquiry concerning truths has been directed to make clear to minds unpractised in studies of the kind, has the following characteristics :—

1. It justifies by reflective reason our spontaneous conviction as to our own existence and that of the world about us.

2. It accepts the declarations of our intellect as to ultimate and necessary truths, and shows how they mutually support each other.

3. It asserts that power of choice and will which our reason and the perception of our moral responsibility assure us we possess.

4. It accords with the teaching of common sense without being bound down within its limits.

5. It establishes the distinction between a higher and a lower set of mental faculties, and shows how they both exist and co-operate in us.

6. It takes due cognizance of our highest perceptions, including those of truth, goodness, and beauty.

7. It supports and enforces the dictates of morality.

8. It shows the essential and necessary reasonableness of religion.

9. It establishes its own truth by showing the necessary validity of our primary intuitions, which can only be denied by an act of intellectual suicide.

The answer to our inquiry as to truth may, then, be most briefly expressed as follows :—

Truth is a relation between our thoughts and things external, which relation reposes on the correspondence of created things to the Intellect of their Creator, in whose image and likeness reason shows us that our own intelligence has been made, and by whose overruling providence

the whole material universe was originally created, and has since been gradually and harmoniously evolved.

Thus we have naturally revealed to us the supreme fact of God's existence and a hierarchy of duties, the right fulfilment of which should be the aim of every human existence. The ultimate judgment and precept of an intellect devoted both to science and to goodness is well expressed by those solemn words with which, for so many centuries, the noblest edifices ever raised by man have annually resounded: "*Spiritus Domini replevit orbem terrarum. Venite adoremus.*"

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